Missing Bearing Plate
121-2690
TR-1A

PRICE $2.00

HEATH COMPANY • BENTON HARBOR, MICHIGAN

HEATHKIT®
ASSEMBLY MANUAL

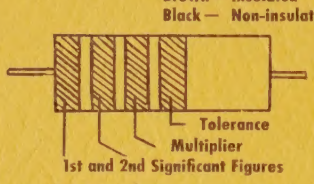
HEATHKIT® by DAYSTROM

TAPE RECORDER
MODEL TR-1A SERIES

STANDARD COLOR CODE — RESISTORS AND CAPACITORS

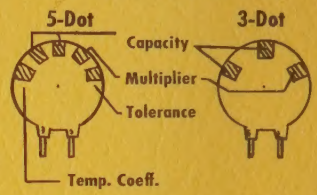
INSULATED UNINSULATED Color	FIRST RING BODY COLOR First Figure	SECOND RING END COLOR Second Figure	THIRD RING DOT COLOR Multiplier
BLACK	0	0	None
BROWN	1	1	0
RED	2	2	00
ORANGE	3	3	,000
YELLOW	4	4	0,000
GREEN	5	5	00,000
BLUE	6	6	000,000
VIOLET	7	7	0,000,000
GRAY	8	8	00,000,000
WHITE	9	9	000,000,000

AXIAL LEAD RESISTOR

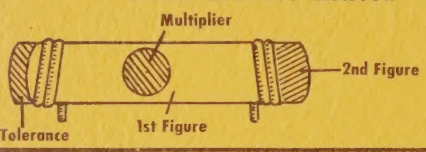


Wire wound resistors have 1st digit band double width

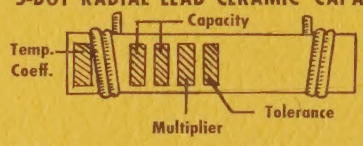
DISC CERAMIC RMA CODE



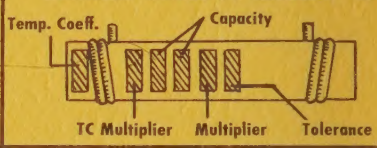
RADIAL LEAD DOT RESISTOR



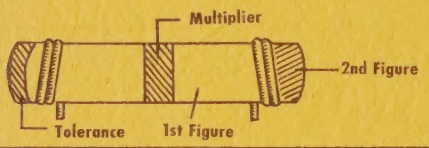
5-DOT RADIAL LEAD CERAMIC CAPACITOR



EXTENDED RANGE TC CERAMIC HICAP



RADIAL LEAD (BAND) RESISTOR



BY-PASS COUPLING CERAMIC CAPACITOR

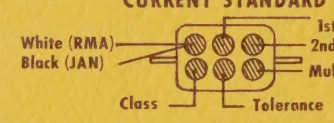
AXIAL LEAD CERAMIC CAPACITOR

The standard color code provides all necessary information required to properly identify color coded resistors and capacitors. Refer to the color code for numerical values and the zeroes or multipliers assigned to the colors used. A fourth color band on resistors determines tolerance rating as follows: Gold = 5%, silver = 10%. Absence of the fourth band indicates a 20% tolerance rating.

The physical size of carbon resistors is determined by their wattage rating. Carbon resistors most commonly used in Heathkits are ½ watt. Higher wattage rated resistors when specified are progressively larger in physical size. Small wire wound resistors ½ watt, 1 or 2 watt may be color coded but the first band will be double width.

MOLDED MICA TYPE CAPACITORS

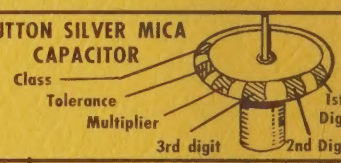
CURRENT STANDARD CODE



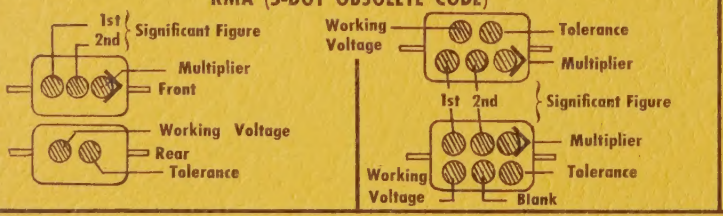
JAN & 1948 RMA CODE

RMA 3-DOT (OBSOLETE) RATED 500 W.V.D.C. ± 20% TOL.

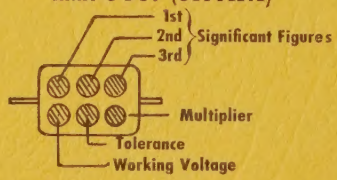
BUTTON SILVER MICA CAPACITOR



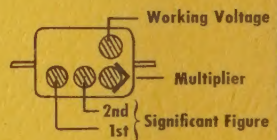
RMA (5-DOT OBSOLETE CODE)



RMA 6-DOT (OBSOLETE)

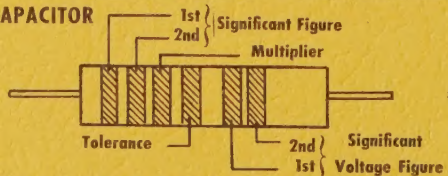


RMA 4-DOT (OBSOLETE)



MOLDED PAPER TYPE CAPACITORS

TUBULAR CAPACITOR

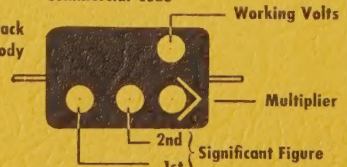


Normally stamped for value

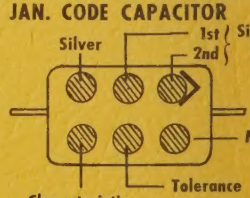
A 2 digit voltage rating indicates more than 900 V. Add 2 zeros to end of 2 digit number.

MOLDED FLAT CAPACITOR

Commercial Code



JAN. CODE CAPACITOR



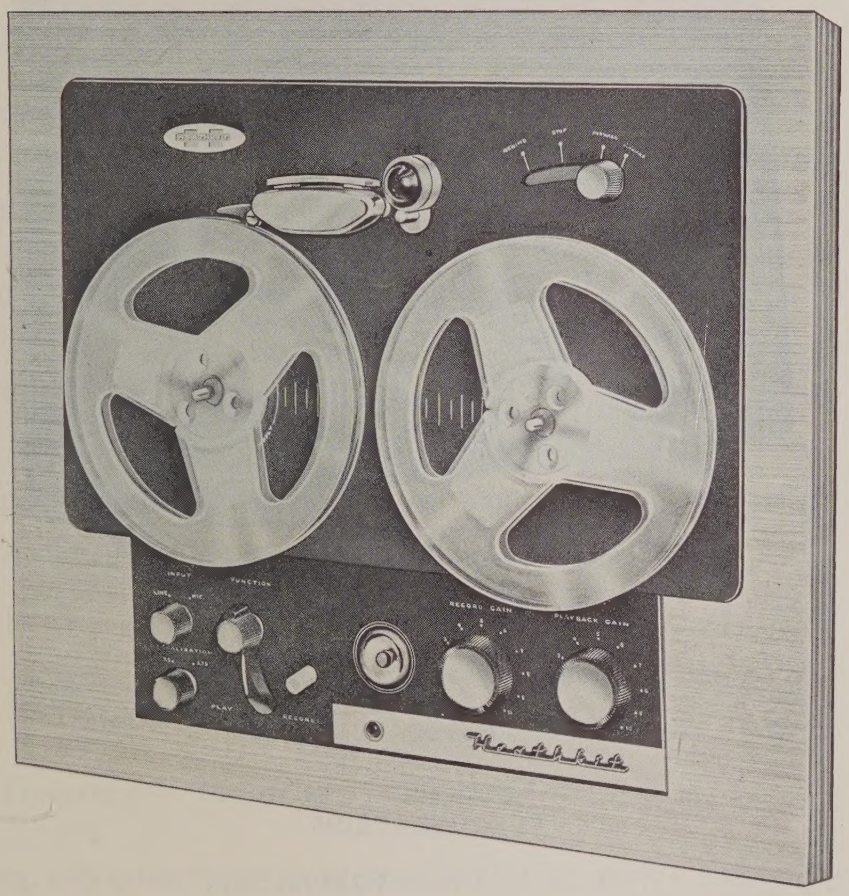
The tolerance rating of capacitors is determined by the color code. For example: red = 2%, green = 5%, etc. The voltage rating of capacitors is obtained by multiplying the color value by 100. For example: orange = 3 × 100 or 300 volts. Blue = 6 × 100 or 600 volts.

In the design of Heathkits, the temperature coefficient of ceramic or mica capacitors is not generally a critical factor and therefore Heathkit manuals avoid reference to temperature coefficient specifications.

Courtesy of Centralab

ASSEMBLY AND OPERATION OF THE HEATHKIT TAPE RECORDER

MODEL TR-1A SERIES



The Heathkit model TR-1A Tape Recorder was designed to fulfill the need for a quality tape recorder and tape preamplifier at a nominal cost. The latest design techniques have been applied in order to obtain the maximum of quality at a minimum cost. Only quality components have been included in the Heathkit TR-1A Tape Recorder.

The TR-1A Tape Recorder will be constructed in two completely separate phases. The mechanical section should be completed before the electronic section is unpacked. The entire mechanical unpacking section should be read before attempting to unpack any portion of the kit.

In order to obtain the high performance that has been designed into this kit, it is extremely important that you take time to read the manual carefully and exercise care in performing each step. The reward will be a greater sense of confidence, both in the tape deck and in your ability.

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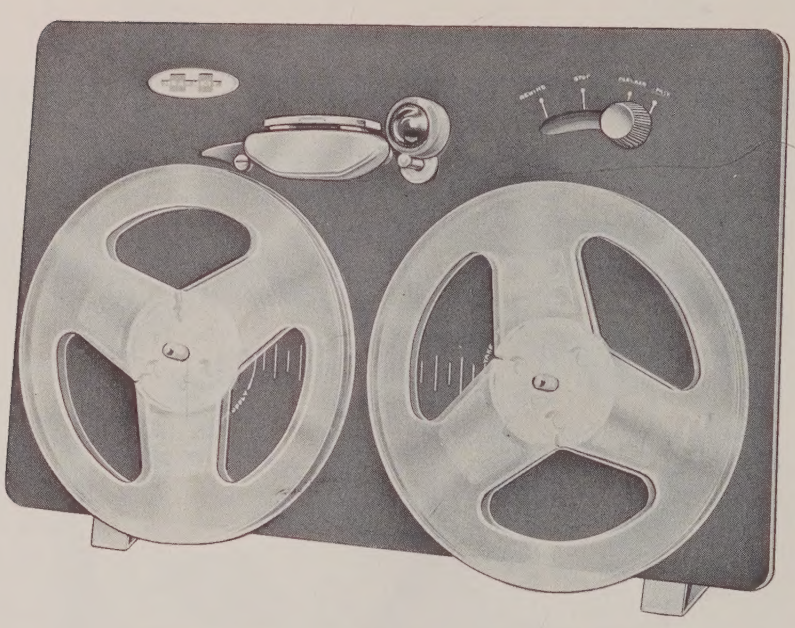
Heath Company

TRANSPORT MECHANISM



SPECIFICATIONS

Tape Speed:	7 1/2 in./sec. 3 3/4 in./sec.
Fast Forward Time:	5 min. for 1200 foot reel.
Rewind Time:	1.25 min. for 1200 foot reel.
Flutter and Wow:	
7 1/2 in./sec.:	Less than .3% peak (.21% RMS).
3 3/4 in./sec.:	Less than .4% peak (.28% RMS).
Motor:	4-pole induction, 117 volt 60 cycle AC.
Maximum Reel Size:	7 in. reel.
Bearings:	Sintered Bronze Bearings on all rotating parts.
Dimensions:	Tape Deck: 15 1/2" wide x 9 1/2" high x 4" below panel.
Shipping Weight:	22 lbs.
Net Weight:	17 lbs.

MODEL TR-1A MONOPHONIC HEAD CHARACTERISTICS

Erase Head		Record-Playback Head	
Track Width:	.125 in.	Track Width:	.090 in.
Gap:	Double Gap (each .005 in.).	Gap Width:	.00016 in.
Inductance:	53 mh at 1000 cycles.	Inductance (1 kc):	.3 h.
Impedance (60 kc):	22,000 Ω	Impedance (1 kc):	2,000.
Current (60 kc):	12-14 ma (13 nominally)	Current (Audio):	.06 ma.
Erasure:	60 db.	Current (Bias - 60 kc):	.8 ma.
Saturated Signal Frequency:	200 cycles	Playback Level:	2.5 mv.

MODEL TR-1AH HALF-TRACK STEREOPHONIC HEAD CHARACTERISTICS

Erase Head		Record-Playback Head	
Track Width:	.125 in.	Track Width:	.090 in.
Gap:	Double Gap (each .005 in.).	Gap Width:	200 micro inches.
Inductance (1 kc):	5 mh.	Inductance (1 kc):	.3 h.
Impedance (60 kc):	1.75 KΩ	Impedance (1 kc):	2000 Ω.
Current (60 kc):	17 ma.	Current (Audio):	.043 ma.
Erasure:	60 db.	Current (Bias):	1.0 ma.
Saturated Signal Frequency:	200 cycles	Playback Level:	1.8 mv.

MODEL TR-1AQ QUARTER-TRACK STEREOPHONIC HEAD CHARACTERISTICS

Erase Head		Record-Playback Head	
Track Width:	.055 in.	Track Width:	.043 in.
Impedance (60 kc):	2000 Ω	Gap Width:	.0001 in.
Current (60 kc):	17 ma.	Impedance (1 kc):	3300 Ω.
Erasure:	60 db.	Audio Current:	.03 ma.
Saturated Signal Frequency:	200 cycles	Bias Current (60 kc):	.30 ma.

INTRODUCTION

The fundamental purpose of any tape transport mechanism is to move recording tape past the recording heads at a uniform and accurate rate of speed. Some method of supplying tape to the Recording Heads, at an even tension, and collecting it after passing through the machine, is required. Some high-speed means of reeling tape in a forward and reverse direction should also be incorporated.

All tape decks perform these basic functions in one way or another. Many include extra gadgets which do not add to the quality of the recorded sound, but they do add to the unit's cost.

The Heathkit TR-1A provides all the necessary functions for normal operation with extreme simplicity of design. Fine bearings and close machining tolerances are observed in the Capstan and drive members, where precision counts, providing fine performance at low cost.

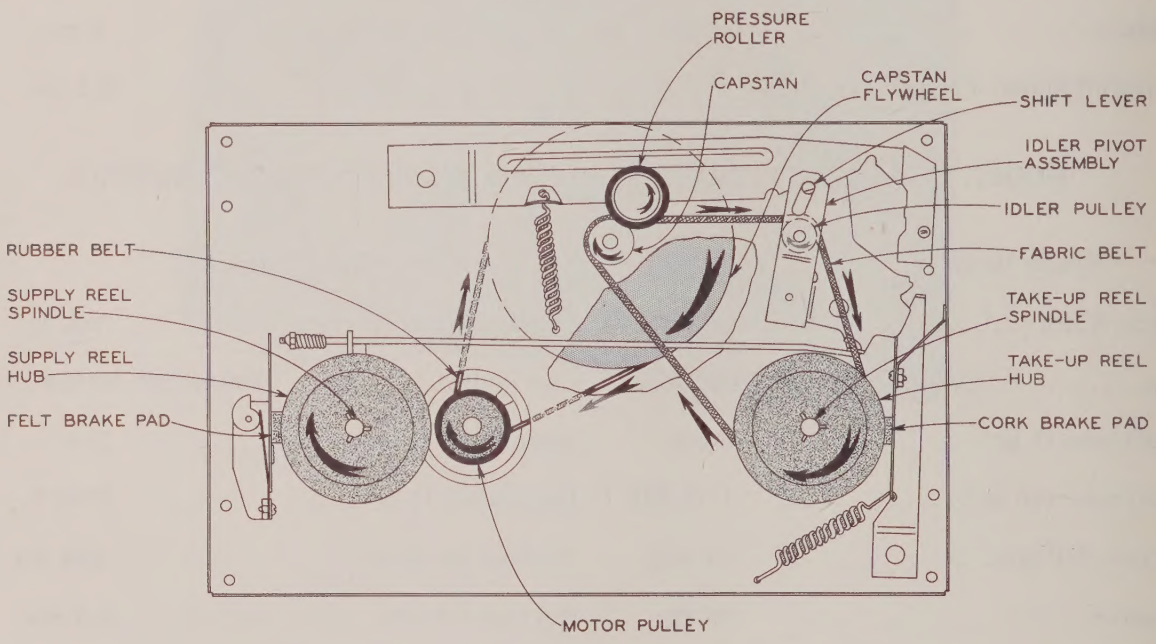


Figure 1

ARROWS INDICATE DIRECTION OF ROTATION OF PARTS WITH POWER APPLIED TO DECK

MECHANICAL DESCRIPTION

The Capstan is driven by the Motor Pulley through a rubber belt. The Capstan speed is determined by the ratio between the Motor Pulley diameter and Capstan Flywheel diameter. The two grooves of different diameter on the Motor Pulley provide the 7 1/2 in./sec. and 3 3/4 in./sec. tape speeds. Uniformity of tape speed is aided by the large balanced Capstan Flywheel. Tape is driven forward by the "pinch" between the Capstan and rubber Pressure Roller. The Take-Up Reel Spindle Hub is driven by the fabric belt from a hub on the Capstan shaft. The fabric belt tension is set so that belt slippage allows the Take-Up Reel to spool-in tape only as fast as it comes from the Capstan. FAST FORWARD is provided by releasing the "pinch" on the tape at the Capstan, and increasing tension on the fabric belt so that there is no longer slippage in the drive between Capstan and Take-Up Reel. The Supply Reel Spindle is driven in reverse, or REWIND, when the Supply Reel Spindle Hub is brought into contact with the Motor Pulley Hub. A felt pad, acting against the Supply Reel Spindle Hub, supplies drag and supply reel braking. A cork pad, acting against the Take-Up Reel Spindle Hub, provides braking for the Take-Up Reel.

The foregoing was a brief mechanical description which should supply a general understanding of the operation of this tape deck. A detailed description follows for those who wish a more thorough understanding of the operating principles involved.

MOTOR ASSEMBLY: The tape deck is powered by a single, four-pole induction motor with a nominal shaft speed of 1550 RPM. The formed mounting plate on which the motor is mounted is attached to the main chassis by three symetrically placed resilient rubber shock mounts which effectively minimize the transmission of inherent motor vibration to the transport mechanism and tape head assembly. The Motor Pulley is a combination rubber driving surface and a two-step pulley which accepts the round rubber belt which drives the Capstan Flywheel. A cooling fan is attached to the opposite end of the Motor Shaft.

POWER TRANSMISSION SYSTEM: Power is transmitted to the functional parts of the mechanism by the previously mentioned Motor Pulley. The Capstan Flywheel is driven directly by a round rubber belt. When this belt is in the Motor Pulley groove having the smaller diameter, the Capstan (flywheel shaft) is rotating at the correct speed to move 3 3/4 inches of tape across the heads each second. When this belt is in the Motor Pulley groove with the larger diameter, the Capstan transports 7 1/2 inches of tape per second.

The Capstan Flywheel and rubber Drive Belt provide the means by which the tape speed uniformity is maintained. The relatively large mass presented by the carefully balanced flywheel tends to smooth out instantaneous variations in speed. This, coupled with the extremely flexible Drive Belt, effectively isolates the Capstan from the Drive Motor, assuring minimum wow and flutter. The tape is driven in the FORWARD mode by the "pinch" between the Capstan and the rubber Pressure Roller. This "pinch" is maintained by spring tension on the Pressure Roller.

The rubber drive portion of the Motor Pulley transmits power directly to the Supply Reel Spindle Hub when the spindle hub is brought into contact with it. Power is transmitted to the Take-Up Spindle by a fabric belt. The fabric belt is driven by a grooved hub mounted on the Capstan shaft; the belt drives the grooved Take-Up Reel Spindle Hub. An Idler Pulley which moves with the Shift Lever acts as a clutch to control the transmission of power to the Take-Up Reel by tightening the fabric belt. A slotted mounting hole for the Idler Pivot Assembly allows the fabric belt to be adjusted for proper take-up tension. A fabric belt was chosen for this application because there must be a certain amount of "controlled slip" between the Capstan and Take-Up Reel Spindle. This "slip" is required because the Take-Up Reel must spool in tape only as fast as it comes from the Capstan drive, without causing undue stress to the tape or over-riding the speed control function of the Capstan.

A FAST FORWARD mode of operation is supplied by releasing the "pinch" on the tape at the Capstan and increasing the tension on the fabric belt so that it no longer allows slippage between the Capstan and the Take-Up Reel Spindle.

DRAG AND BRAKING: During the FORWARD mode of operation, a slight drag must be applied to the Supply Reel Spindle Hub so that the tape leaves the Supply Reel with a constant tension. The drag is supplied by a felt pad which is held lightly against the Supply Reel Spindle Hub by spring tension. This drag also serves to maintain proper tape-head contact. In the FAST FORWARD mode this drag is released. The felt pad also acts as a brake for the Supply Reel. A cork brake pad acting against the Take-Up Reel Spindle Hub supplies braking for the Take-Up Reel. This pad is released during all modes of operation and acts only to stop the Take-Up Reel when returning the Shift Lever to STOP from any of the other positions.

MOUNTING: The TR-1A Series Deck may be mounted in either a vertical or horizontal position. If the vertical position is used, two rubber keepers (#240-47) are supplied to keep the reels from falling off of the spindles.

UNPACKING INSTRUCTIONS

The mechanical deck of the TR-1A Series Tape Recorder will be constructed first. Read this entire section of the manual before starting to unpack the kit. Remove carton marked "Transport Mechanism" from the main package. Replace all packing material in the main package and close the top to insure against any loss of parts. Set this main carton aside for the time being; it contains all parts needed for the electronic construction phase, which will be accomplished after completion of the Transport Mechanism. Open the Transport package and check all parts against the Parts List on Page 29 of this manual. Parts can be readily identified by comparing them to the life-size Parts Pictorial Sheet. It is suggested that, if adequate space is available, the parts be laid directly on the Parts Pictorial Sheet as they are unpacked and checked off the Parts List. This will speed up the assembly because parts can be easily located by number and description when they are called for in the Step-By-Step instructions. Note that several large sheet metal parts have been omitted from the Parts Pictorial for obvious reasons. When all parts have been identified and checked against the Parts List, the packing material may be discarded. If some shortage is found in checking the parts, please notify us promptly and return the inspection slip with your letter to us. Unpacking instructions for the Electronics Package are contained in the Electronics Manuals in the TE-1A Package. Do not unpack it until so instructed, to prevent confusion resulting from intermixing the many small parts.

PROPER SOLDERING PROCEDURE

There are only a few solder connections which will be made during the Mechanical Section of this kit, but it is felt that soldering procedure should be discussed briefly in this section. The complete discussion which appears in the TE-1A manual should be read before the Electronic section is started. Properly soldered connections are not at all difficult to make but it would be advisable to observe a few precautions. First of all, before a connection is to be soldered, the connection itself should be clean and mechanically strong. Do not depend on solder alone to hold a connection together. The tip of the soldering iron should be bright and clean of excess solder. Use enough heat to thoroughly flow the solder smoothly into the joint. Avoid excessive use of solder and do not allow a flux flooding condition to occur which could conceivably cause a leakage path between adjacent terminals on the connecting jack. Excessive heat will also burn or damage the insulating material used in the manufacture of this assembly. BE SURE TO USE ONLY GOOD QUALITY ROSIN CORE RADIO SOLDER.

NOTE: ALL GUARANTEES ARE VOIDED AND WE WILL NOT REPAIR OR SERVICE INSTRUMENTS IN WHICH ACID CORE SOLDER OR PASTE FLUXES HAVE BEEN USED. WHEN IN DOUBT ABOUT SOLDER, IT IS RECOMMENDED THAT A NEW ROLL PLAINLY MARKED "ROSIN CORE RADIO SOLDER" BE PURCHASED.

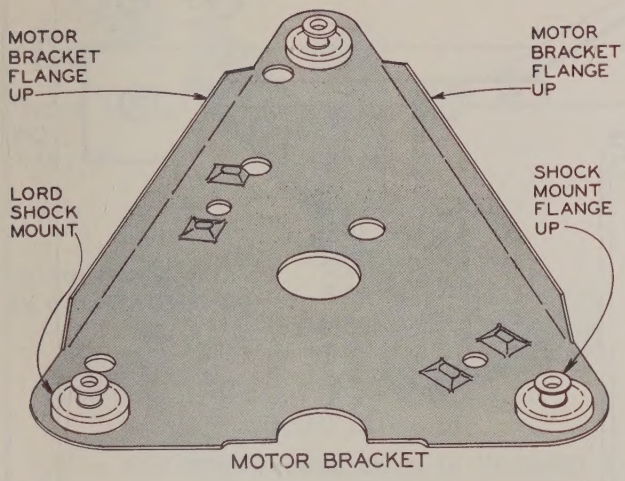


Figure 2

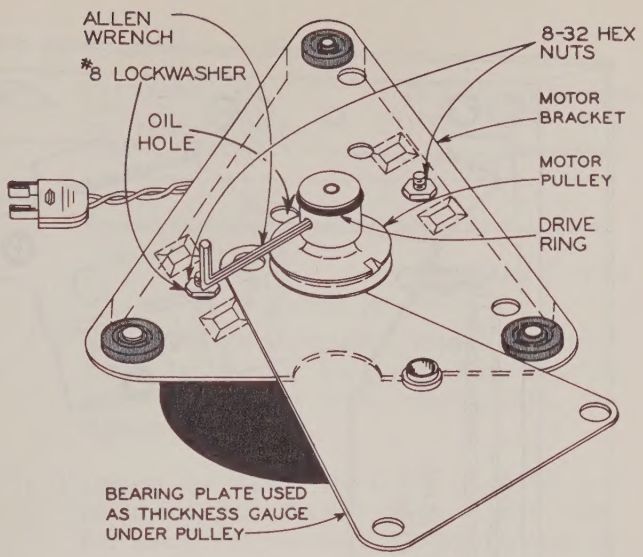


Figure 3

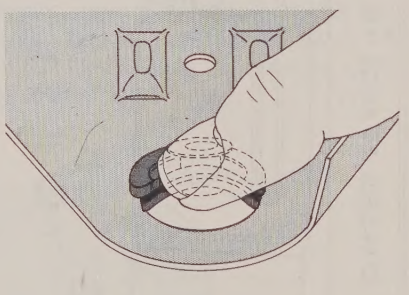
STEP-BY-STEP ASSEMBLY

In the following section, refer to Figures 2 and 3.

( ) Insert the three Lord Shock Mounts (#240-49) in the extreme corner holes of the Motor Bracket (#240-21). The side of the shock mount with the metal flange must be on the same side (face the same way) as the motor bracket flanges. The shock mounts are inserted in the same way as a standard rubber grommet, as shown.

( ) Mount the Motor (#240-42) to the Motor Bracket on the same side as the bracket flanges. Use the two 8-32 hex nuts (#240-6) with two #8 internal-tooth lockwashers (#240-12) under the nuts. Snug the nuts down tight. Orient the motor so that the raised oil hole will fit into the appropriate hole in the motor bracket.

( ) Mount the Pulley (#240-29) on the end of the Motor Shaft which protrudes through the bracket. Insert one corner of the Outer Bearing Plate (#240-23) between the pulley and the bracket to space the pulley the proper distance from the bracket. Make sure the setscrew will engage the flat side of the Motor Shaft before tightening with the



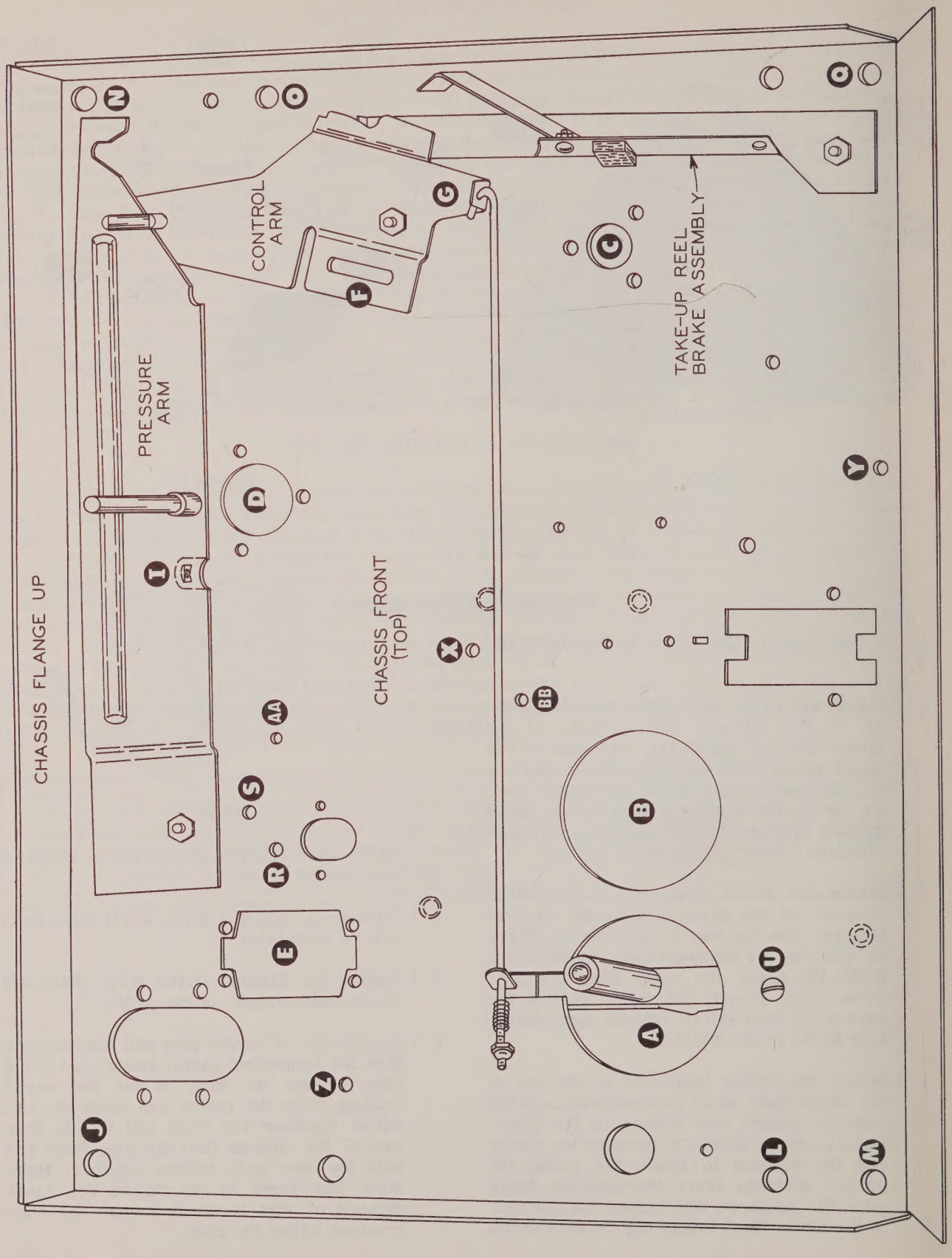
Detail

Allen wrench (#490-18), which is supplied with the kit.

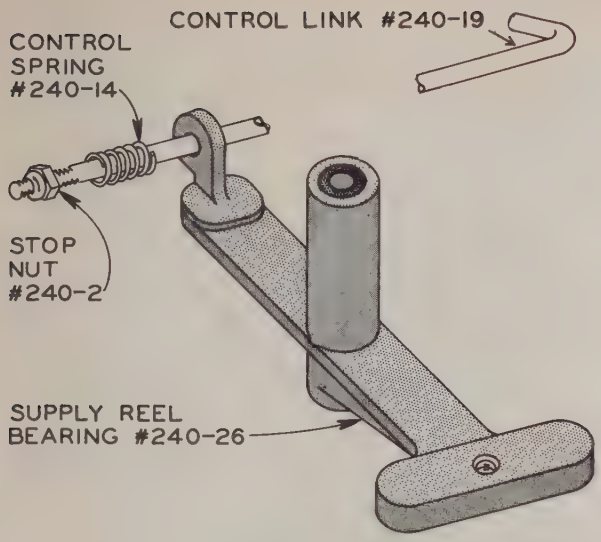
( ) Remove the bearing plate; set it aside as it will be used later.

( ) Install the Rubber Drive Ring (#240-39) on the outer groove of the pulley.

( ) Locate the AC power plug and disassemble into its component parts. Install one of the plug prongs on each of the two wires leading from the motor and twist the two wires together for their full length. Now install the prongs into the plug body and bolt the two body halves together. Make sure that there is no chance for loose strands of wire to short across the connections within the plug.


CHASSIS FLANGE UP
CONTROL ARM
PRESSURE ARM
CHASSIS FRONT (TOP)
TAKE-UP REEL BRAKE ASSEMBLY
A
B
C
D
E
F
G
I
J
L
M
N
O
R
S
U
X
Y
Z
AA
BB

Pictorial 1



Detail 1A

In the following section refer to Pictorial 1, Figure 4, Details 1A and 1B.

( ) If the Pressure Arm, Control Arm, and the Take-Up Reel Brake Assembly are not riveted in place on the main chassis, install them according to Pictorial 1 and Detail 1B. Tighten screws securely.

( ) Insert the threaded end of the Control Link (#240-19) through the ear of the Supply Reel Bearing (#240-26) as shown in Detail 1A.

( ) Slip Control Spring (#240-14) on the Control Link and screw Stop Nut (#240-2) several turns onto the threads.

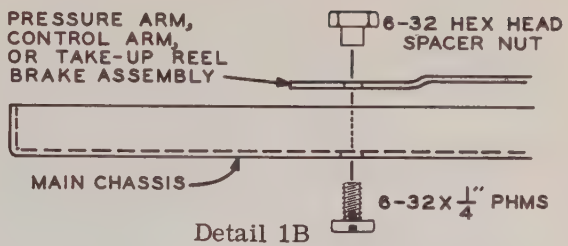
( ) Locate the Chassis Assembly and position as shown with the edge flanges up and the six mounting studs down. The pressure arm should be on the edge away from you with the Take-Up Reel Brake at the right.

( ) Insert the hook of the Control Link through hole "G" from the side towards you and allow the Supply Reel Bearing to hang through the large hole "A".

( ) Position the Supply Reel Bearing as shown in Pictorial 1.

( ) Push a 6-32 x 3/8" pan head machine screw (#240-68) through hole "U" from the top and screw it into the threaded hole in the Supply Reel Bearing. Tighten this screw down.

( ) Screw the 6-32 hex nut (#240-5) and a #6 internal-tooth lockwasher (#240-11) on the bottom of the screw inserted in the previous step. Tighten the nut.



Detail 1B

( ) Now, with a screwdriver, loosen the screw just a bit so that the Supply Reel Bearing is free to move from side to side. Retighten the hex nut.

( ) Locate the Supply Reel Hub (#240-60) and place one Nylon Washer (#240-9) on the thinner shaft. Put one drop of a good household oil on the shaft and insert it down through the Supply Reel Bearing.

( ) Now, from the bottom, place one more nylon washer on the shaft next to the bottom of the bearing.

( ) With the whole assembly lying on its face on the work bench, install a #2-3/16" "E" washer (#240-58) into the groove of the Supply Reel Hub shaft.

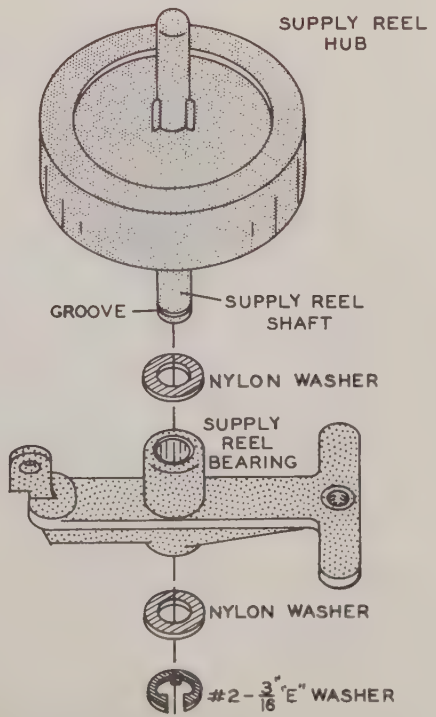


Figure 4

TAKE-UP REEL ASSEMBLY

In the following section, refer to Pictorial 1 and Figure 5.

( ) Install the Take-Up Reel Bearing (#240-27) in hole "C" from the front. Place the longer portion of the bearing down through the hole and insert three 6-32 x 1/4" pan head machine screws (#240-66) with #6 internal-tooth lockwashers (#240-11) from the bottom of the chassis. Tighten screws.

( ) Locate the Take-Up Reel Hub (#240-61) and place one nylon washer (#240-9) on the shaft. Apply one drop of oil to the shaft and insert it through the Take-Up Reel Bearing.

( ) Now place one more nylon washer on the shaft next to the bottom of the bearing.

( ) With the whole assembly lying on its face on the work bench, install a #2-3/16" "E" washer (#240-58) into the groove in the same manner as in the previous assembly. NOTE: The Take-Up Reel Brake must be released to spin the Take-Up Reel Hub.

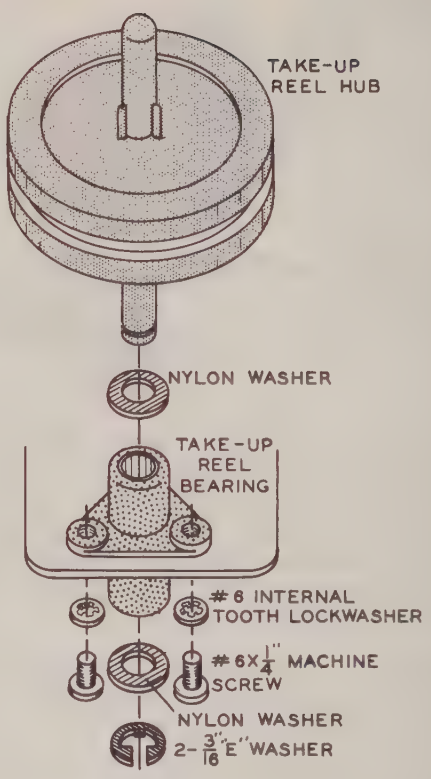


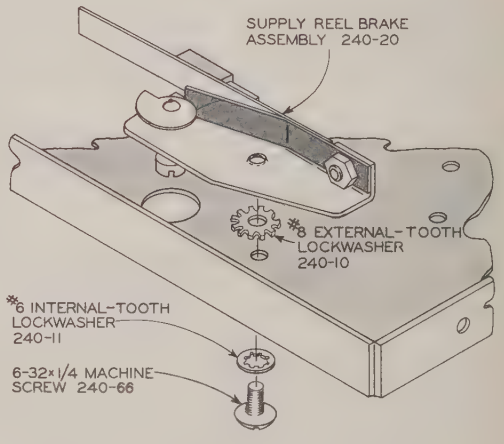
Figure 5

SUPPLY REEL BRAKE ASSEMBLY

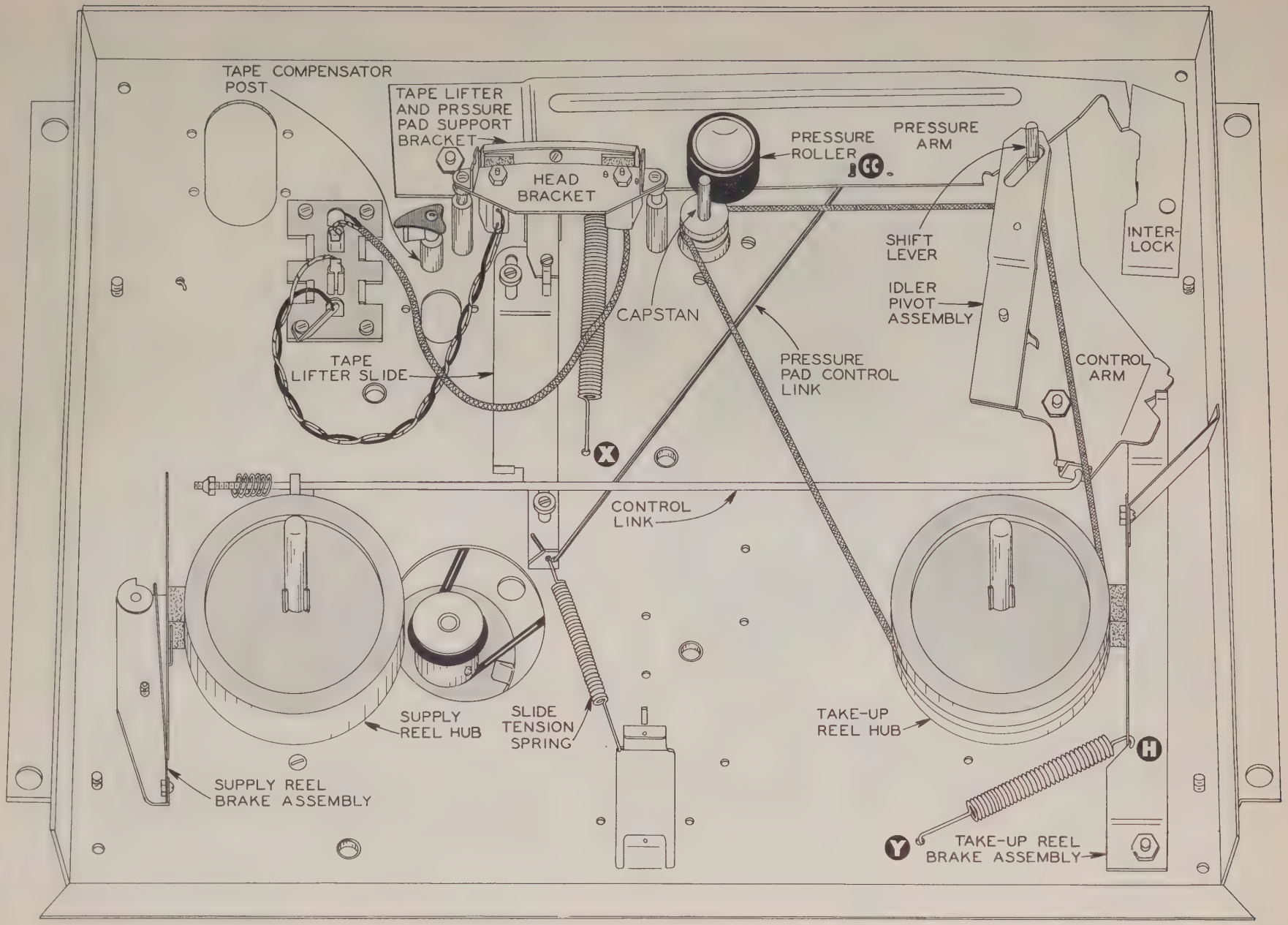
In the following section refer to Pictorials 1 and 2 and Detail 2.

( ) After returning the chassis to the position shown in Pictorial 1, install the Supply Reel Brake Assembly (#240-20) with the adjustment screw sticking down through hole "V". A 6-32 x 1/4" pan head machine screw (#240-66) with a #6 internal-tooth lockwasher (#240-11) is inserted through hole "W" from the bottom. A #8 external-tooth lockwasher (#240-10) is placed between the Brake Assembly and the chassis. Closely examine Detail 2 and note placement of the #6 and #8 lockwashers.

( ) Center the Adjustment Screw in the clearance hole "V" and tighten the Mounting Screw in hole "W".


SUPPLY REEL BRAKE ASSEMBLY 240-20
#8 EXTERNAL-TOOTH LOCKWASHER 240-10
#6 INTERNAL-TOOTH LOCKWASHER 240-11
6-32x1/4 MACHINE SCREW 240-66

Detail 2


TAPE COMPENSATOR POST
TAPE LIFTER AND PRSSURE PAD SUPPORT BRACKET
HEAD BRACKET
PRESSURE ROLLER
CC
PRESSURE ARM
SHIFT LEVER
INTER-LOCK
IDLER PIVOT ASSEMBLY
CAPSTAN
TAPE LIFTER SLIDE
PRESSURE PAD CONTROL LINK
CONTROL ARM
X
CONTROL LINK
SUPPLY REEL HUB
SLIDE TENSION SPRING
TAKE-UP REEL HUB
H
SUPPLY REEL BRAKE ASSEMBLY
Y
TAKE-UP REEL BRAKE ASSEMBLY

MOTOR BRACKET INSTALLATION

In the following section refer to Pictorial 3.

( ) Place a Motor Support Washer (#240-22) over each of the three short mounting studs on the back of the chassis. See Pictorial 3.

( ) Install a 3/16" SAE washer (#240-8) over each of the three short mounting studs.

( ) Hook the Rubber Motor Belt (#240-40) over the Motor Pulley on the Motor Bracket Assembly and place the Motor Bracket Assembly over the three short studs. The semicircular cutout must be positioned over the Supply Reel Bearing.

( ) Place three Motor Mounting Washers (#240-57) on the studs and tighten with a 6-32 x 1/4" pan head machine screw (#240-66) in the end of each of the short mounting studs.

CAPSTAN INSTALLATION

In the following section, refer to Pictorials 1 and 3 and Detail 3A.

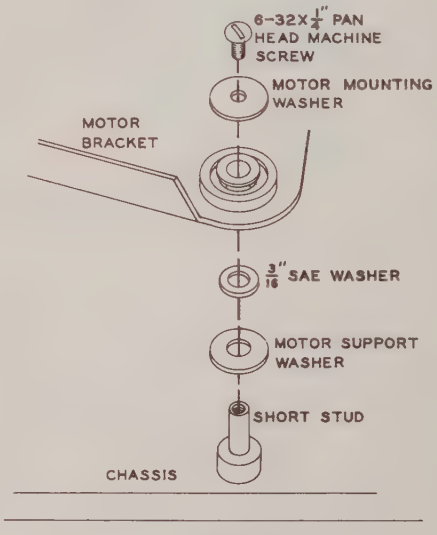
( ) Insert the Capstan Assembly (#240-28) from the bottom of the chassis through hole "D" and secure in place with two 6-32 x 1/4" pan head machine screws (#240-66) with #6 internal-tooth lockwashers (#240-11) under the heads. Tighten them down; the threaded stud is not used at this time.

( ) Again turn the chassis over on its face and stretch the Motor Belt which was previously placed around the Motor Pulley over the Capstan Assembly.

( ) Place the Outer Bearing Plate (#240-23) over the rear end of the Capstan Shaft so that the three mounting studs protrude through the three mounting holes in the bearing plate. Apply one drop of oil to the rear end of the shaft, where it passes through the bearing.

( ) Place three 3/16" SAE washers (#240-8) over the three mounting studs, and screw on the three 12-24 hex nuts (#240-7).

( ) Tighten these nuts down evenly. If the flywheel does not seem to spin freely, the bearing has been pushed out of alignment by improper tightening of the three hex nuts just installed. Loosen and repeat the tightening procedure.



Detail 3A

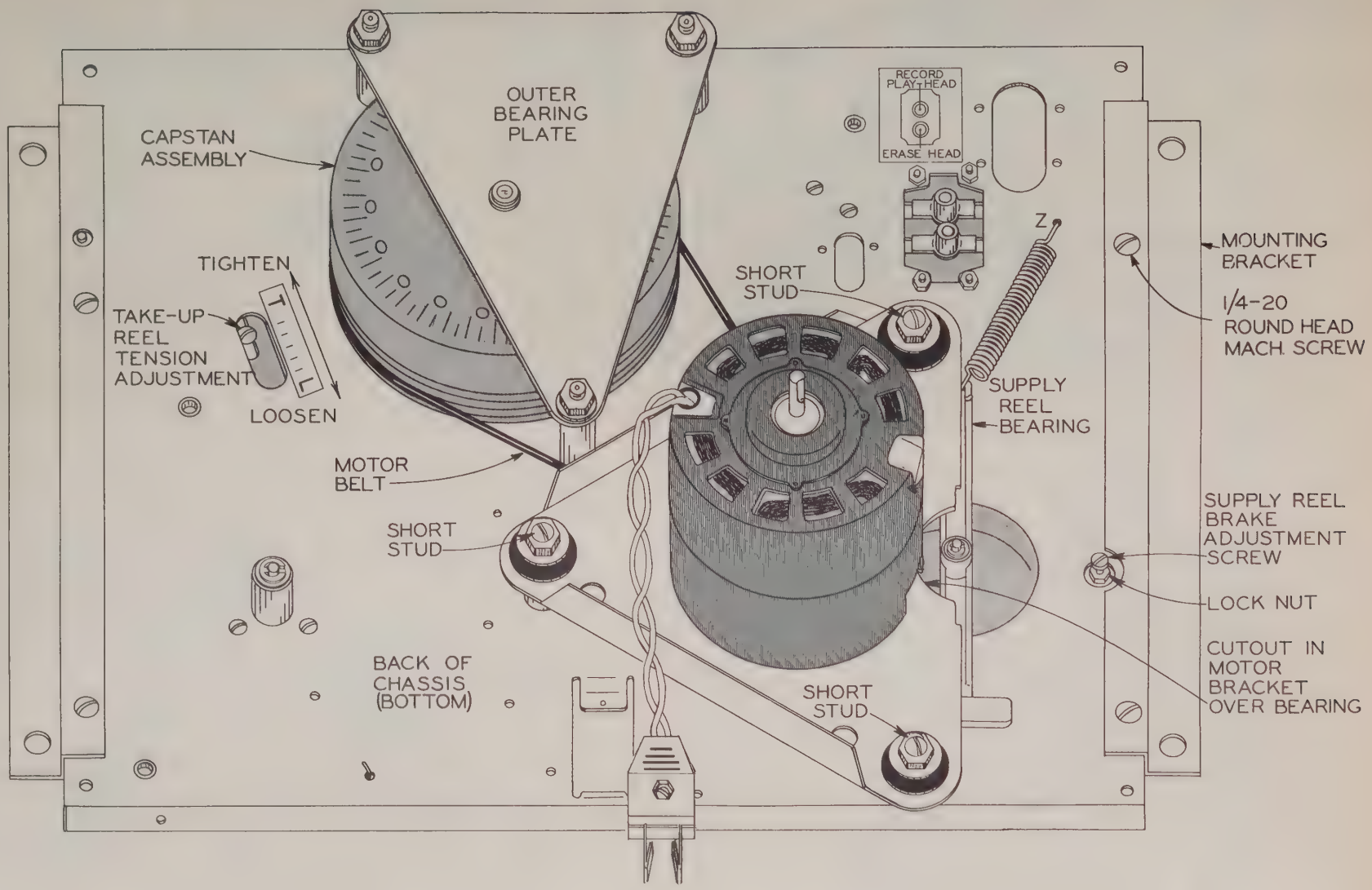
TENSION SPRING INSTALLATION

In the following section, refer to Pictorials 1, 2 and 3.

( ) Stretch one Tension Spring (#240-41) between hole "I" in the Pressure Arm (which is riveted to the chassis) and hole "X" on the chassis. The rounded spring hook should be inserted into hole "I".

( ) Install another Tension Spring (#240-41) between hole "H" in the Take-Up Reel Brake and hole "Y" in the chassis. The rounded spring hook should be inserted into hole "H".

( ) Install the last Tension Spring (#240-41) between the hole in the rear of the Supply Reel Bearing and hole "Z" in the chassis. This spring is installed on the back of the chassis. The rounded spring hook should be inserted into the supply reel bearing.


OUTER BEARING PLATE
CAPSTAN ASSEMBLY
RECORD PLAY HEAD
ERASE HEAD
Z
MOUNTING BRACKET
1/4-20 ROUND HEAD MACH. SCREW
TIGHTEN
TAKE-UP REEL TENSION ADJUSTMENT
T
L
LOOSEN
SHORT STUD
SUPPLY REEL BEARING
MOTOR BELT
SHORT STUD
SUPPLY REEL BRAKE ADJUSTMENT SCREW
LOCK NUT
CUTOUT IN MOTOR BRACKET OVER BEARING
BACK OF CHASSIS (BOTTOM)
SHORT STUD

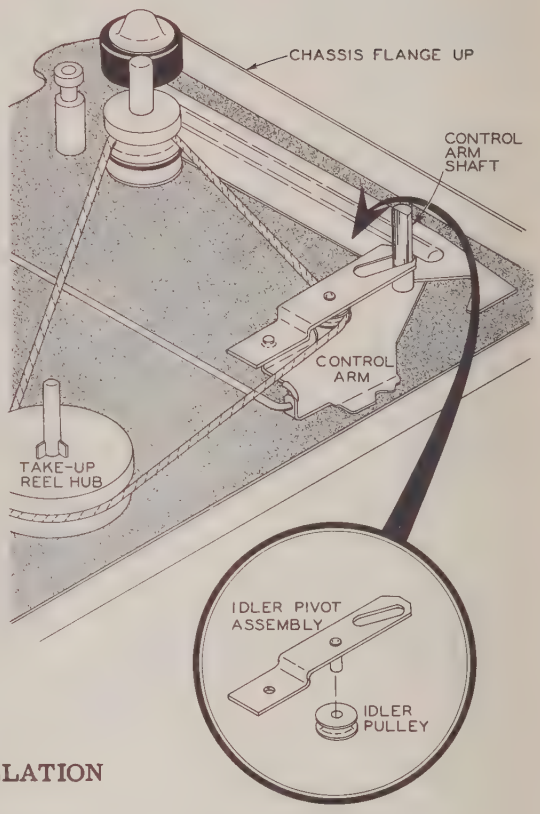
TAKE-UP BELT INSTALLATION

In the following section, refer to Pictorial 2 and Detail 3B.

( ) Loop the Fabric Take-Up Belt (#240-30) around the Capstan and the Take-Up Reel Hub in the grooves provided. Notice that the belt passes under the cork Take-Up Reel Brake Pad when it is in its groove in the Take-Up Reel Hub.

( ) Install the Nylon Idler Pulley (#240-18) on its shaft on the Idler Pivot Assembly (#240-17). Now invert this assembly and place it on the Control Arm with the Control Arm Shaft sticking through the slot above the Idler Pulley. Make sure the belt passes between the Idler Pulley and the Control Arm Shaft. See Detail 3B.

( ) Bolt this assembly in place, using one 6-32 x 1/4" pan head machine screw (#240-66) from the back of the chassis through the slot into the threaded hole in the Idler Pivot Assembly. No lockwasher should be used here. Just tighten this down lightly as it will have to be adjusted later.



Detail 3B

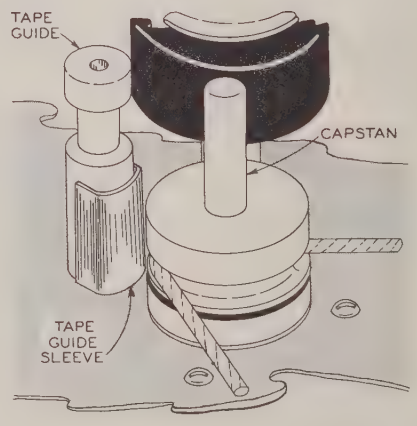
TAPE GUIDE INSTALLATION

In the following section refer to Pictorials 1 and 2 and Detail 4.

( ) Locate one of the Tape Guides (#240-31) and screw it onto the threaded Capstan Stud sticking through the chassis next to the Capstan. The larger portion of the guide post should be toward the chassis. No lockwasher should be used. To tighten this post, grip the lower portion of it with pliers, but be careful not to damage the edges of the slot as these edges act as a tape guide and could scratch or damage tape. A piece of cardboard inserted between the pliers and Tape Guide would prevent damage to the guide.

( ) Locate the Tape Guide Sleeve (#240-48) and slip it over the post just installed; push it down tight against the chassis. This acts as a stop to keep the Take-Up Belt from slipping out of the Capstan groove. See Detail 4.

( ) Bolt the remaining Tape Guide (#240-31) in hole "S", using a 6-32 x 3/8" pan head



Detail 4

machine screw (#240-68) with one #6 internal-tooth lockwasher (#240-11) under the head. Tighten this screw down.

( ) Bolt the Compensator Post (#240-32) in hole "R" in the same way as the Tape Guide using one 6-32 x 3/8" pan head machine screw (#240-68) and one #6 internal-tooth lockwasher (#240-11). Tighten down securely. See Figure 8.

TAPE INTERLOCK INSTALLATION

In the following section, refer to Pictorials 1 and 2.

( ) Locate the Interlock (#240-46) and lay it in position (with flanges down) on the chassis between holes "N" and "O", with the threaded mounting hole directly above the small threaded hole in the chassis.

( ) Put a #6 internal-tooth lockwasher (#240-11) on a 6-32 x 3/8" pan head machine screw (#240-68) and screw into the threaded mounting hole in the Interlock and then down into the threaded hole in the chassis. While doing this operation, the position of the Interlock should not be changed from the position in which it was placed in the preceding step. Tighten this screw down.

( ) The Interlock should now swing very freely from side to side with this bolt as a pivot. If the Interlock is not free, back the bolt out of the bottom hole and place an edge of one of the Cover Grips (#240-34) under the flange of the Interlock to space it farther from the chassis. Again screw the bolt down into the hole in the chassis. Remove the Cover Grip and the Interlock should now be free to swing. Tighten down the screw.

( ) Plug in your soldering iron now so it will be hot when you need it.

PRESSURE ROLLER ASSEMBLY

In the following section, refer to Pictorials 1 and 2 and Figure 6.

( ) Slip the Felt Washer (#240-37) over the Pressure Arm Post sticking up next to the Capstan.

( ) Slip one of the steel spacer washers (#240-36) over the Pressure Arm Post on top of the felt washer. Apply one drop of oil to the post.

( ) Install the Pressure Roller (#240-16) on the Pressure Arm Post on top of the steel washer. Do not allow oil to get on rubber surface.

( ) Now place another steel spacer washer (#240-36) on top of the Pressure Roller.

( ) The Buna Cork Washer (#240-38) is now placed on top of the last spacer washer.

( ) Push the black Retaining Cap (#240-35) down on top of the Pressure Arm Post until it seats.

NOTE: All head arrays supplied with HEATHKITS have been precision aligned. Do not loosen the

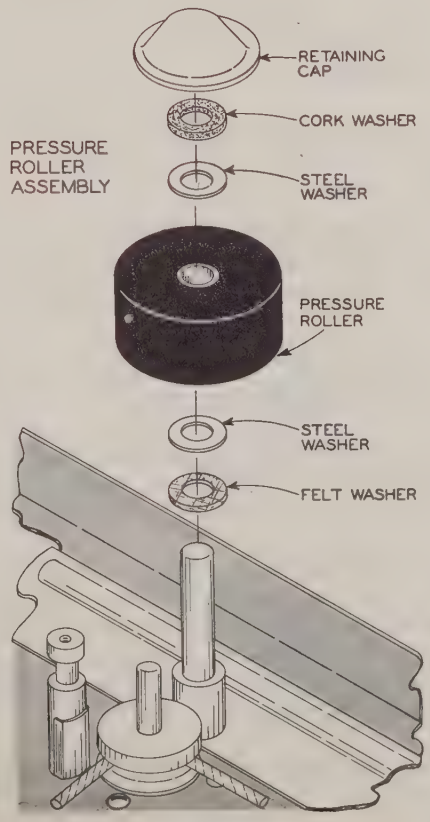
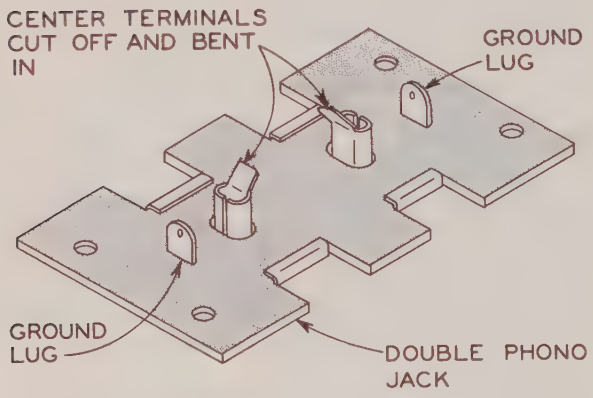


Figure 6

nuts on the mounting studs. If you are constructing either a TR-1AH or TR-1AQ, omit the section below for installing the Monophonic head array and refer to the section for installing the Stereo heads.

TR-1A MONOPHONIC TAPE HEAD ARRAY INSTALLATION



Detail 5

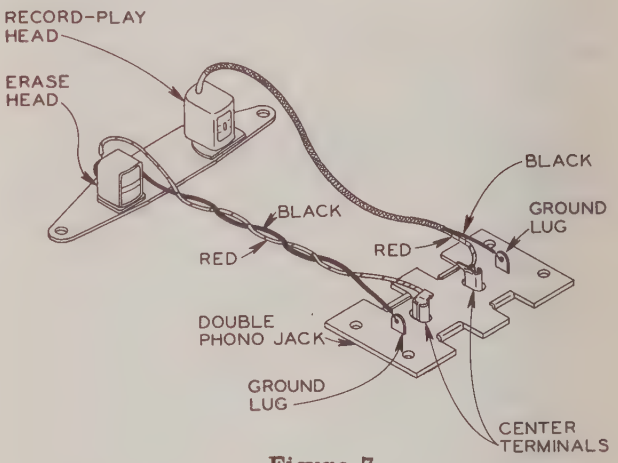


Figure 7

In the following section, refer to Pictorial 2, Figures 7, 8, 9, and Detail 5.

( ) Locate the Tape Head Assembly (#240-50); push the shielding back 3/4" from the end of the shielded wire and hold there with a wrap of cellophane tape.

( ) Locate the Double Phono Jack (#434-82); cut off the two center lugs at the second hole and bend as shown in Detail 5.

( ) Connect the black shielded wire to one of the ground lugs on the double phono jack. Solder this connection. See Figure 7.

( ) Connect the red lead from this same cable to the adjoining center terminal on the jack. Solder this connection.

( ) Connect the black wire of the twisted pair from the other head to the remaining ground lug on the double jack. Do not solder.

( ) Solder the red wire of this twisted pair to the adjoining center terminal. Make certain at this time that neither of the center terminals are shorted together or to their respective ground lugs. This would make the unit inoperative.

( ) Install the Head Assembly with the heads down on the two Tape Guide Posts as shown in Figure 8. Use 6-32 x 3/8" pan head machine screws (#240-68) with the two Cover Grips (#240-34) under the heads. Notice that two #6 internal-tooth lockwashers (#240-11) are placed between the cover grips and the head assembly. Align the cover grips directly in line with the head bracket and tighten the screws. The heads have been prealigned. DO NOT TOUCH MOUNTING SCREWS HOLDING HEADS TO HEAD BRACKET.

( ) Install the Double Phono Jack in hole "E" with the connections to the shielded wire toward the top edge of the chassis. Use four 3-48 x 1/4" binder head machine screws (#250-49), four #3 lockwashers (#254-7), and four 3-48 x 3/16" nuts (#252-1). Place a solder lug (#259-6) under the lower left-hand screw head. See Figure 8 and Detail 5A.

( ) Bend the solder lug (#259-6) just installed so that it touches the bottom ground lug of the Double Phono Jack and solder them together. Notice that there is a black wire which also must be soldered. The soldering iron can be unplugged now as it will not be used again in this phase of construction.

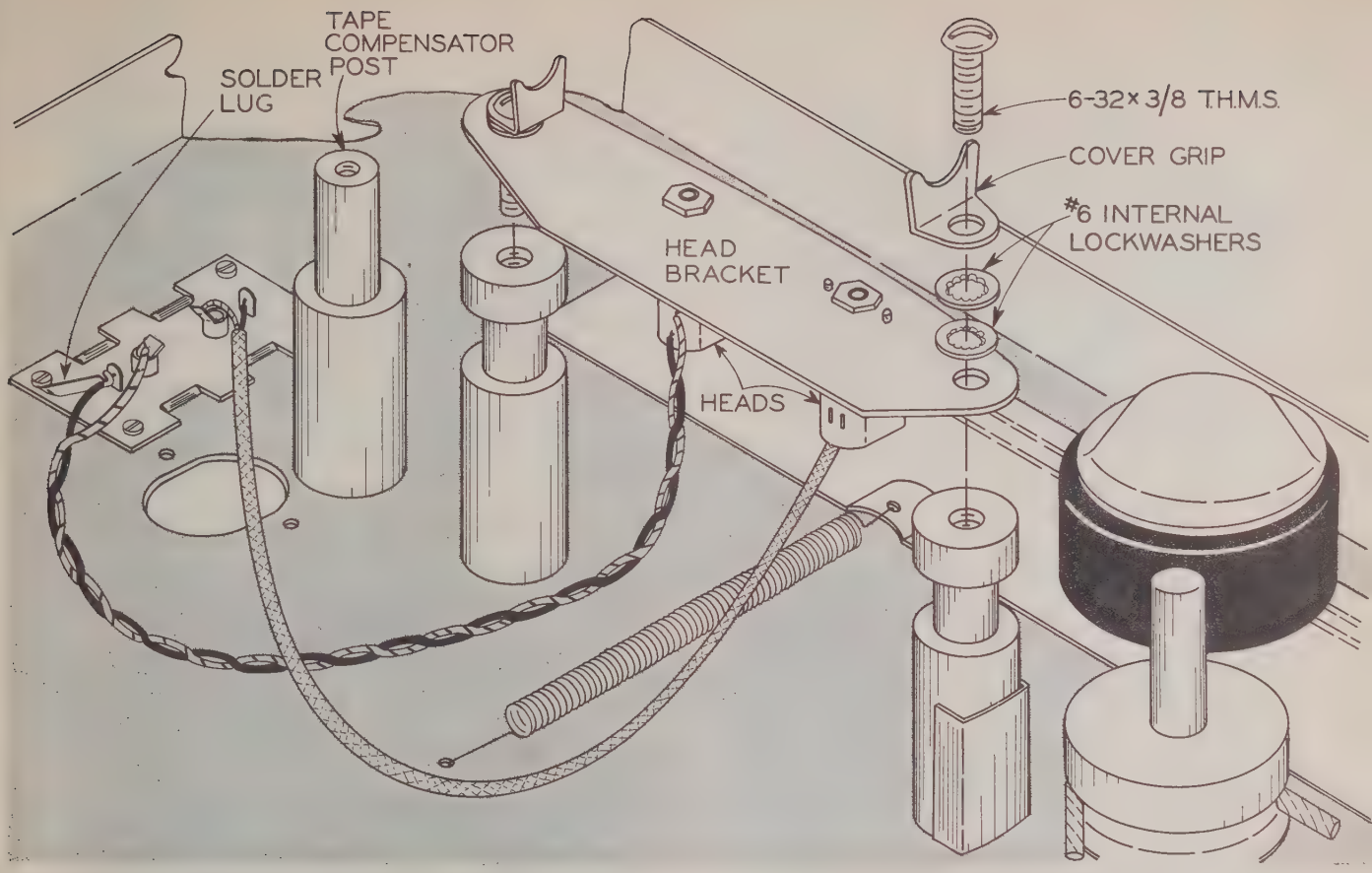
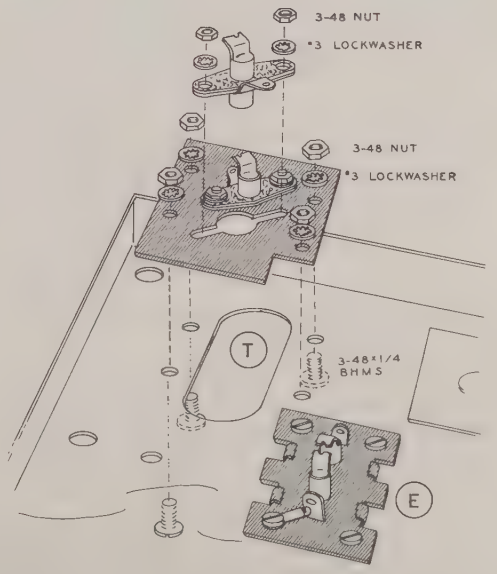


Figure 8

INSTALLATION OF TR-1AH AND TR-1AQ STEREO TAPE HEAD ARRAYS AND CONNECTOR JACKS

NOTE: If you have a head array with a bracket of offset construction, this bracket will not allow the head cover to set level after it is mounted, since both of the head cover grips supplied with your kit are of the long type. To avoid this difficulty a third and shorter head cover grip has been added to your kit. This short clip should be mounted on the end of the head mounting bracket nearest the capstan pressure roller. When the head cover is mounted after construction is finished, be sure that it does not touch the top terminal on the center head. If there is not sufficient clearance, a piece of electrical tape over the terminal or the inside back edge of the cover will prevent shorting.

( ) Locate the Double Phono Jack (#434-82). Cut off the center lugs at the second hole and bend as shown in Detail 5A. Install this jack in hole "E" using four 3-48 x 1/4" Binder Head Machine Screws (#250-49), four #3 lockwashers (#254-7), and four 3-48 x 3/16" nuts (#252-1). Place a solder lug (#259-6) under the lower left-hand screw head. See Detail 5A.



Detail 5A

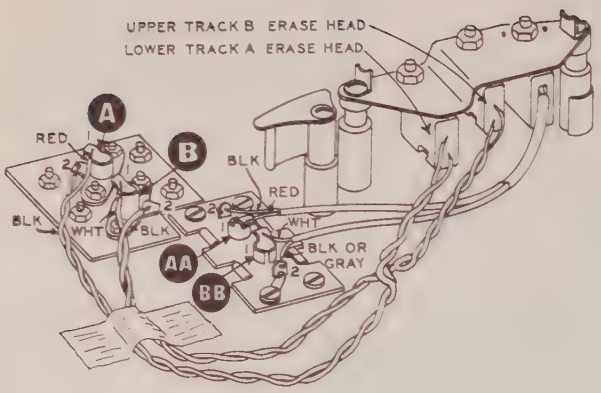


Figure 8A

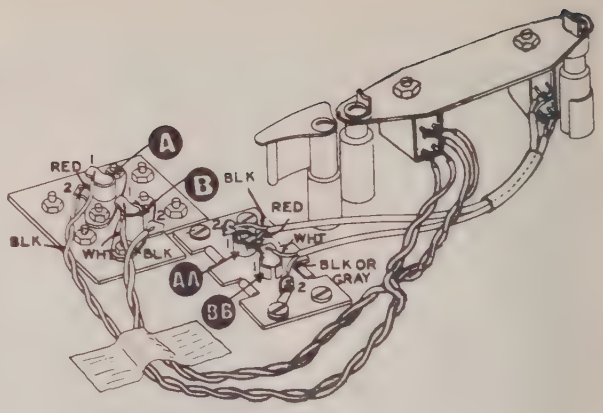


Figure 8B

( ) Mount the two single phono sockets on the connector bracket (#205-M163) as shown in Detail 5A. Use 3-48 hardware and place a #3 lockwasher under each nut. Cut off the center conductors at the second hole and bend as shown in Detail 5A.

( ) Again refer to Detail 5A and mount the phono connector bracket at hole "T". Use 3-48 hardware and #3 lockwashers. Be sure that all terminals are bent enough to avoid contacting the front panel after it is mounted.

NOTE: The next five steps refer to Figures 8A and 8B. If you are constructing a TR-1AH, refer to Figure 8A; or refer to Figure 8B if you are constructing a TR-1AQ.

( ) Install the Tape Head Array (#425-14, if TR-1AH Half-Track Recorder; #425-17 if TR-1AQ Quarter-Track Recorder) on the Tape Guide Posts with the heads down. Use 6-32 x 3/8" pan head machine screws (#240-68) with the Cover Grips (#240-34) under the heads. Notice that two #6 internal-tooth lockwashers are placed between each Cover Grip and the Head Bracket. Align the Cover Grips directly in line with the head bracket and tighten the screws.

( ) Identify the pair of leads from Track A (lower track) erase head to phono jack A. Connect the red lead to terminal A-1 (S-1) and the black lead to terminal A-2 (S-1).

( ) Similarly, connect the white lead of the twisted pair from Track B (upper track) erase head to phono connector terminal B-1 (S-1). Connect the black lead to terminal B-2 (NS).

( ) Connect the pair of leads from Track A (lower track) of the record-play head to phono connector terminal AA. The red lead connects to terminal AA-1 (S-1) and the black lead to terminal B-2 (S-2).

( ) Connect the leads from Track B to phono jack BB. The white lead connects to terminal BB-1 (S-1) and the black lead to BB-2 (NS).

( ) Bend the solder lug previously installed on the double phono jack so that it touches ground lug BB-2. Now solder BB-2 (S-2).

TAPE LIFTER AND PRESSURE PAD INSTALLATION

In the following section, refer to Pictorial 2 on Page 11 and to Figure 9.

( ) Locate the Tape Lifter and Pressure Pad parts. These pieces are packaged together in a plastic bag.

( ) Take the Tape Lifter Slide, the long formed metal piece, and hook under the Control Link as shown in Figure 9; position with the two slotted holes directly over the two threaded holes AA and BB in the chassis.

( ) Secure the Tape Slide in place; use a 6-32 x 1/4" truss head machine screw with a lockwasher and shoulder washer, as shown, in each mounting hole. The mounting screws should pass through the Tape Slide and screw into holes AA and BB.

( ) Attach the Slide Tension Spring between the lower ear of the Lifter Slide and the large rectangular cutout in the chassis.

In the following steps that refer to FORWARD,

FAST FORWARD, REWIND and STOP, refer to the front panel for relative positions of the Shift Lever.

( ) Locate Pressure Pad Control Link (#258-29) and slip it under the fabric belt and heavy control link with the small short bend toward the top as shown in Pictorial 2.

( ) Insert the blade of a screwdriver under the edge of the Pressure Arm and lift the arm enough to hook the Pressure Pad Control Link into hole CC, from the bottom.

( ) Shift the Tape Deck to the FORWARD position and push up on the Tape Lifter Slide until the Pressure Pad Control Link can be hooked into the hole in the bottom ear, as shown in Pictorial 2 and Figure 9. Leave the Slide Tension Spring hooked into the hole as before.

( ) Move the shift lever through all the positions and watch to see that the Tape Lifter Slide moves up in REWIND, STOP and FAST FORWARD, and that no binding exists. Lifting action will be very slight in FAST FORWARD position.

( ) Move the Shift Lever to STOP. Temporarily install the Tape Lifter and Pressure Pad Support Bracket to the Lifter Slide with one 1/4" pan head machine screw in the threaded hole in the upper ear of the Lifter Slide. No lockwasher should be used. Tighten the screw.

( ) Move the Shift Lever through the four positions. The Tape Lifter and Pressure Pads should move away from the heads in REWIND, STOP and FAST FORWARD. When in FORWARD, there should be a very light pressure

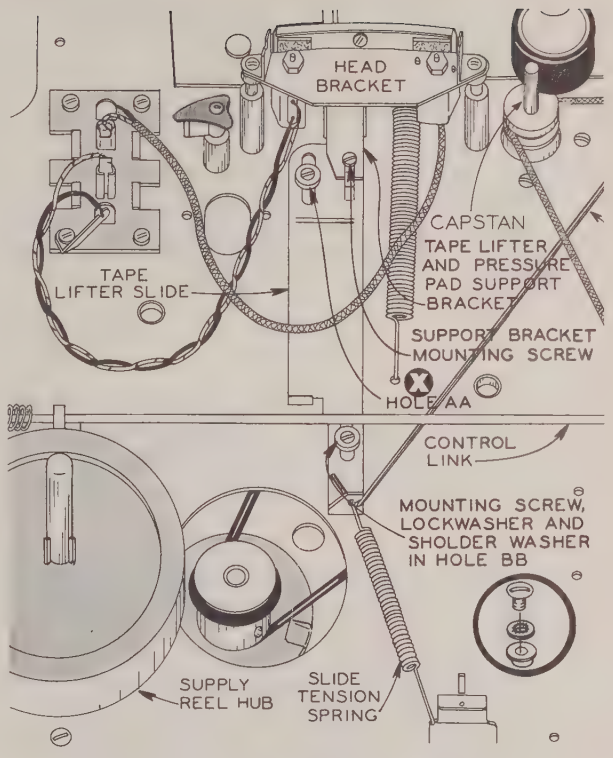


Figure 9

between Pressure Pad Felts and Tape Heads. It may be necessary to bend the Pressure Pad Support Bracket and Pressure Pad Springs slightly to achieve the proper Pressure Pad tension. A very light tension is all that is required to provide optimum contact between tape and heads. Excessive pressure may cause increased wow and flutter and shorten head life.

( ) Now remove the Tape Lifter and Pressure Pad Support Bracket and set it aside until after the front panel is installed.

MOUNTING BRACKET AND PANEL INSTALLATION

In the following section, refer to Pictorials 2 and 3.

( ) Locate the Mounting Brackets (not shown in Pictorial Parts List). These are the two large brackets shaped in the form of a "Z". Find the one with the semicircular cutout in one side; this is the left hand bracket. Mount it on the chassis, as shown, with two of the 1/4" x 20 round head machine screws (#240-13) screwed into the threaded holes "K" and "L" from the back of the chassis. Make certain that the Supply Reel Brake adjusting screw protrudes through the semicircular cutout.

( ) Mount the right hand bracket in a similar fashion with the remaining two 1/4" x 20 round head machine screws in holes "O" and "P". Make certain that the Interlock screw protrudes through the clearance hole provided in the bracket.

( ) Mount the four threaded spacers (#255-23) on the bottom of the front panel under the four mounting holes. Use four of the black

6-32 x 1/4" stove head machine screws (#250-116). Do not tighten completely and do not use lockwashers.

( ) Place the shift lever in FORWARD.

( ) Lay the front panel over the chassis and position it so that all holes have proper clearance around reel hubs, etc. Using the remaining four 6-32 x 1/4" pan head machine screws (#240-66) and #6 internal-tooth lockwashers (#240-11), bolt the bottom ends of the threaded panel spacers to the chassis. Use the large corner holes "J", "M", "N", and "Q". Do not change the position of the front panel while tightening these screws.

( ) Now remove the four black panel screws and remove the panel.

MECHANICAL ADJUSTMENT

Mechanical adjustments will be made with the front panel removed from the deck so that the kit builder will have a better understanding of the operation of the deck and its component parts.

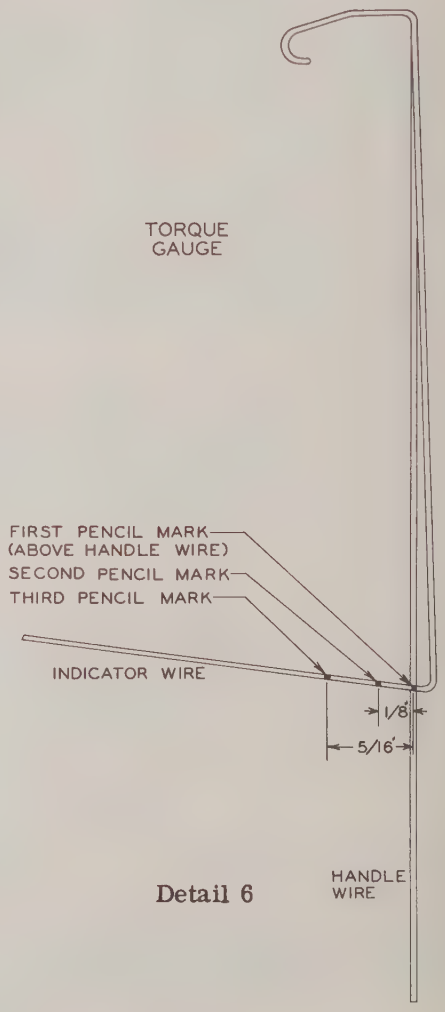
( ) Push the Shift Knob (#462-69) on the Control Arm Shaft and move it to the REWIND position.

( ) With a pliers, tighten the Control Link Stop Nut until the Supply Reel Hub just touches the Motor Drive Ring. Now tighten the nut one more complete revolution. This should provide enough tension for positive drive but not enough to load the motor too heavily.

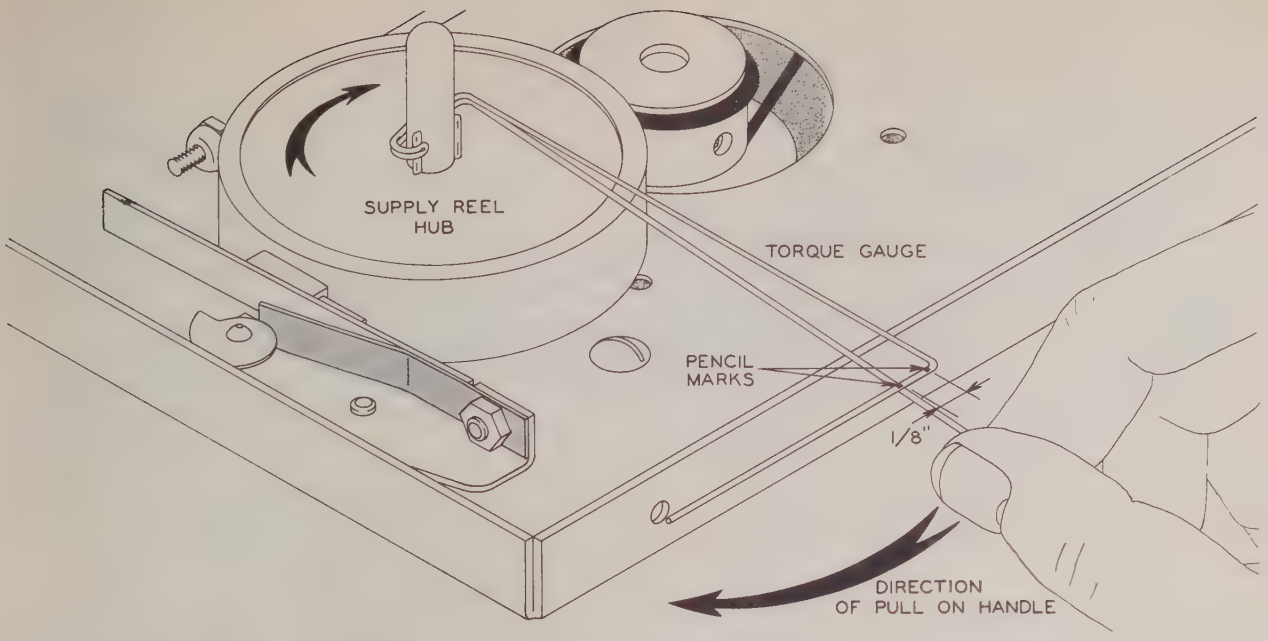
( ) Locate the Torque Gauge (#490-15) and make a pencil mark on the bent wire (indicator portion) exactly above the handle wire as shown in Detail 6.

( ) Make another pencil mark 1/8" farther out the indicator wire from the handle wire. Again see Detail 6. Make a third mark 5/16" from the first mark. These marks indicate proper drag and take-up tension. Continue the marks all the way around the wire.

( ) Move the Shift Knob to the FORWARD position.



Detail 6



Detail 7

( ) Place the Torque Gauge on the Supply Reel Hub as shown in Detail 7 and rotate the handle in a clockwise direction around the hub. While doing this, note the position of the handle in relation to the 1/8" pencil mark, and if it rides past the mark, decrease tension on the Supply Reel Brake by turning the Supply Reel Brake adjustment screw on the back of the chassis in a counterclockwise direction. See Pictorial 3 for location of adjustment screw. The locknut will probably have to be loosened slightly to make adjustment. If the Torque Gauge handle rides short of the mark, tighten the adjustment screw (clockwise).

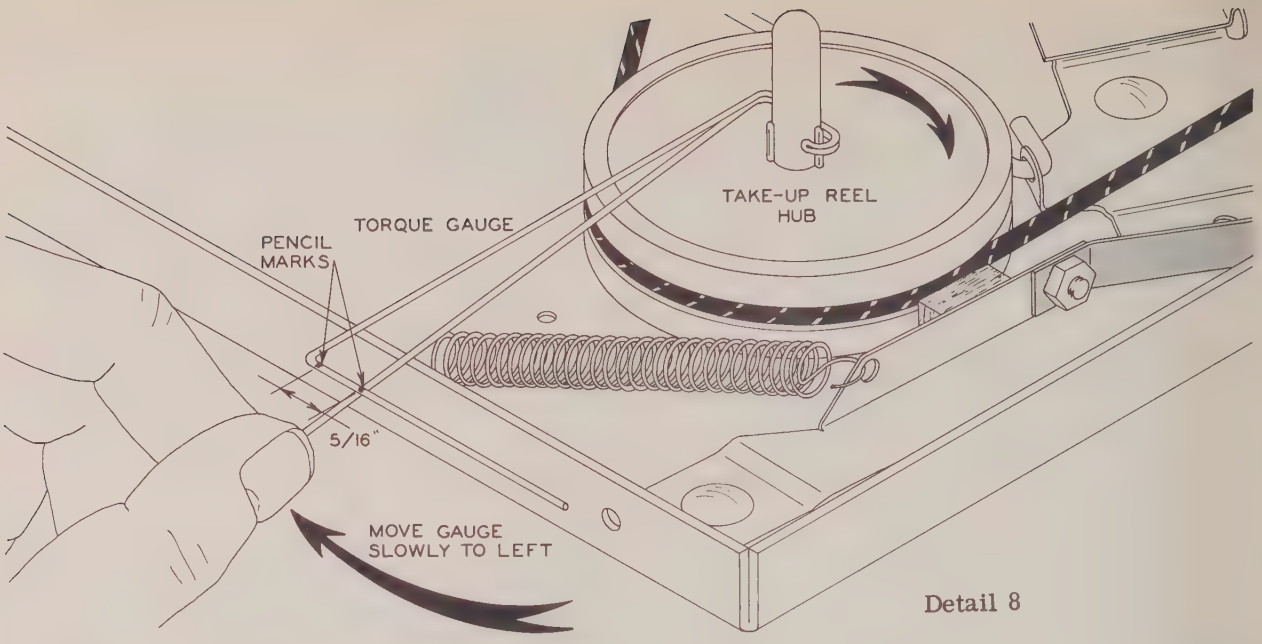
( ) When the screw has been adjusted so that the handle rides at the mark while the hub is turned in a clockwise direction, tighten the locknut on the adjustment screw. Again, check the drag to make certain that tightening the locknut has not upset the tension adjustment.

NOTE: When taking a reading, the gauge must be moving in a clockwise direction or erroneous readings will result. For the following adjustments, the rubber Motor Belt must be running in the large diameter step of the Motor Drive Pulley (7 1/2 in./sec. tape speed).

( ) Plug the Motor into a standard extension cord so that power is applied to the unit. NOTE: The Motor should not be run for long periods of time without the fan or it will overheat.

( ) Check to make sure the Shift Knob is still in FORWARD. Stop the Take-Up Reel hub with your hand and place the Torque Gauge on the Spindle, as shown in Detail 8. With power applied to the reel and with the Torque Gauge handle moving in a clockwise direction around the hub, note the position of the handle in respect to the 5/16" pencil mark. If the handle rides past the mark, loosen the tension on the Take-Up Belt. If it falls short of the mark, tighten the Take-Up Belt. To change tension on the belt, first move the Shift Knob to the STOP position; next, loosen the Idler Pivot Assembly mounting screw. This is the screw in the slot on the back of the chassis. See Pictorial 3 for location of Take-Up adjustment screw. Slide the screw and the Idler Assembly in its mounting slot to change tension on the belt. The "L" on the sticker next to the slot stands for "loosen", "T" for "tighten". After loosening or tightening the belt, retighten the mounting screw and move the Shift Lever back to FORWARD. Again check the Reel Hub with the Torque Gauge. Repeat the adjustment process until the gauge is deflected 5/16" on the indicator wire. Note again, that when taking a reading, the gauge must be moving in a clockwise direction or erroneous readings will result.

( ) With the Motor still running and the Shift Knob in the STOP position, place a full reel of tape on the Supply Reel Hub and an empty reel on the Take-Up Reel Hub. Thread the tape past the head and between the Cap-



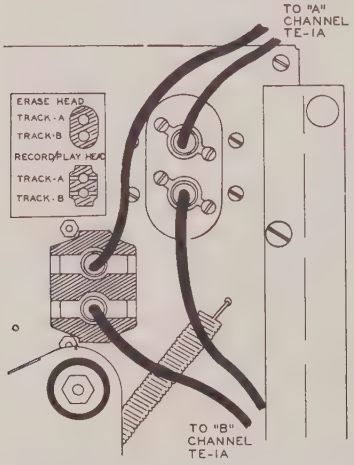
Detail 8

stan and Pressure Roller. Move the Shift Lever to FORWARD; the tape should be moving from the left hand reel to the right hand reel.

( ) Shift to FAST FORWARD. The tape should still move from left to right but about two to three times as fast. Reel about half the tape onto the Take-Up Spool.

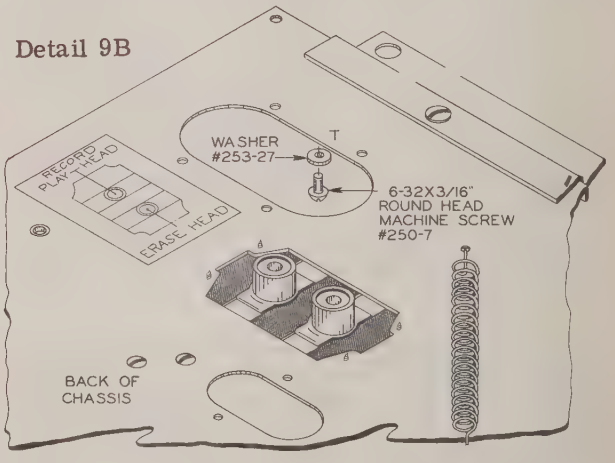
( ) Now shift to REWIND. The tape should spool from right to left at a high rate of speed. Shift between STOP and REWIND several times. The tape should start and stop smoothly without jerks. If the tape starts too slowly, tighten the Control Link stop nut slightly. If it starts with a jerk, loosen the Control Link stop nut slightly.

( ) This completes adjustment of the Tape Deck. In the future, the drag and take-up tension can be adjusted without removing the front panel. It would be suggested that these adjustments be checked and readjusted, if necessary, after about 50 hours of running, when drag pads and belts have worn in, or if degraded performance is noticed.



Detail 9A

Detail 9B



( ) Find the RECORD-PLAY and ERASE HEAD label and peel off the backing paper. Stick this label to the back of the chassis in the position shown in Detail 9A (for Stereo) or Detail 9B (for Monaural).

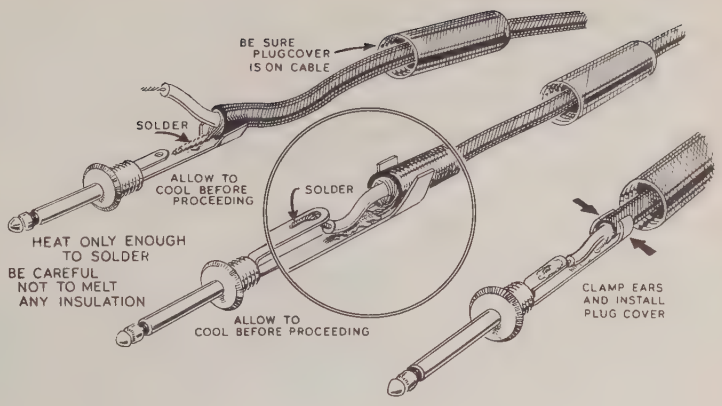
NOTICE: The recording heads are prealigned at the factory. No azimuth adjustment is necessary. Do not try to change head alignment.

( ) Take the front panel and the remaining hardware and store them until it is time to install the deck into your cabinet. These pieces must be installed on the deck after it is mounted in its permanent position.

This completes the transport construction. Open the package marked TE-1A and proceed with the construction of the electronics section of the TR-1A.

NOTE: If you have either a TR-1AH or TR-1AQ Stereo Recorder, the second channel microphone and plug are accounted for in the TE-1A Manual. However, perform the following step for both microphones at this time.

( ) Install the Phone Plug (#438-3) on the loose end of the Microphone Cord, as shown in Detail 10.


BE SURE PLUGCOVER IS ON CABLE
SOLDER
ALLOW TO COOL BEFORE PROCEEDING
SOLDER
HEAT ONLY ENOUGH TO SOLDER
BE CAREFUL NOT TO MELT ANY INSULATION
ALLOW TO COOL BEFORE PROCEEDING
CLAMP EARS AND INSTALL PLUG COVER

Detail 10

INSTALLATION INSTRUCTIONS

There are many possible ways in which the deck and electronics sections of the TR-1A can be positioned in the final custom installation. It would be impossible however, for the Heath Company to evaluate and supply mounting information for all these possible combinations; therefore, the layout shown at the beginning of the manual is recommended. Complete instructions for installing the units in this way are provided. Anyone wishing to use some other physical layout will have to modify the instructions to fit their particular requirements.

In all custom installations where the TE-1A is mounted on another panel, some means for supporting the back of the chassis must be provided. There are two methods by which the TE-1A chassis can be bolted to supporting members. These are shown in the installation section of the TE-1A Manual.

STEP-BY-STEP INSTALLATION INSTRUCTIONS

( ) Find the TR-1A Mounting Board Template and cut it out on the outside panel line with a pair of scissors. Lay this cutout on the Mounting Board in the position in which the panel will be placed. Use a sharp object, such as an ice pick, to make holes through the template where marked into the wood Mounting Board. These holes will mark the cutout corners. Remove the template and draw lines on the Mounting Board connecting the marks just made. Carefully drill holes at the corners and cut along the lines which form the outline of the mounting hole with a keyhole or saber saw. When drilling the holes, be careful to keep the drill bit within the cutout lines.

( ) Install four rubber grommets (#73-6) in the four large chassis mounting bracket holes. Push the four tubular spacers (#255-2) into the grommet center holes. These grommets will act as shock mounts to suppress the transmission of motor vibration from the deck to the mounting board.

( ) Set the deck into the mounting cutout and mark the position of the grommet centers on the wood mounting board. The deck should be centered in the cutout so that no portion of the chassis or brackets touch the mounting board except the four rubber mounts. After marking the mounting board, remove the deck and drill a 3/32" "pilot" hole at each of the four marks.

( ) Install the fan (#240-43) on the rear end of the motor shaft with the fan hub towards the motor body. Set the deck back into the cutout and secure it in place with the four #6 x 3/4" truss head sheet metal screws (#250-125).

( ) Locate the Heathkit Monogram and install it on the Tape Deck Front Panel with the two speednuts (#252-16). Make sure the monogram is right side up before forcing the speednuts over the two mounting pins.

( ) Put the front panel in place on the deck and bolt it down with four black 6-32 x 1/4" stove head machine screws (#250-116). Position the lead wires so that they cannot become entangled in the moving parts.

( ) At this time it would be wise to place the TE-1A in position in its hole to be sure that there is enough clearance around the chassis. This is also the time to install the TE-1A Rear Chassis Support. This support will have to be custom built for every installation by the builder. Refer to the suggested methods of chassis support in the TE-1A manual.

( ) Locate the Tape Feed Compensator (#240-44) and Compensator Cover (#240-45) and install on the compensator post with one 6-32 x 1/4" black stove head machine screw. Position as shown in Pictorial 2 on Page 11, and tighten down the screw. No lockwasher should be used. Adjust the position of compensator with the tape reel on the supply reel spindle.

( ) Bolt the tape Lifter and Pressure Pad Support Bracket to the Tape Lifter Slide (underneath the recording heads).

( ) Push the Head Cover (#240-33) on top of the Head Assembly so that it is held in place by the cover grips and install the shift knob (#462-69) on the shift lever.

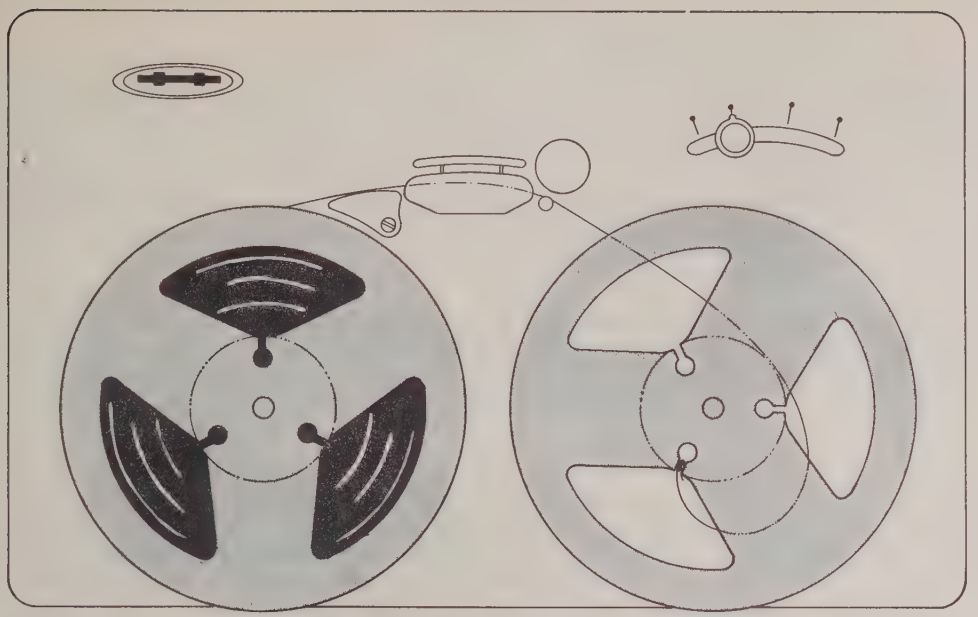
( ) Set the TE-1A into the mounting hole and secure it to the Rear Chassis Support with either the two 6-32 mounting bolts or the 10-24 bolt and T-nut. This completes the TR-1A installation. Refer to the TE-1A manual for the electrical connections between the deck and preamplifier.

HINTS ON OPERATION OF THE TR-1A DECK

Certain precautions should be observed when operating the TR-1A Tape Deck to assure that maximum performance will be obtained.

In general, when shifting from one function to another, move one step at a time and wait until the tape comes to a stop before shifting into another mode of operation. For example, when shifting from FORWARD to REWIND, pause at the STOP position until the tape comes to a stop.

TAPE THREADING
DIAGRAM



and then shift to REWIND. It is not necessary to return to STOP when shifting from FORWARD to FAST FORWARD. However, when shifting from FAST FORWARD to STOP, a short pause at the FORWARD position until the tape comes to a stop should be provided. The deck will not return directly to the FORWARD mode of operation from FAST FORWARD. An interlock is provided to automatically hold the pressure roller away from the capstan when shifting from FAST FORWARD. To return to FORWARD, the shift lever must first be moved to STOP and then to FORWARD.

When the deck is not in use, the shift lever should always be left in STOP. If it is left in any other position, the rubber drive ring and pressure roller will become permanently deformed, causing degraded performance.

To shift speeds, all that is required is to "nudge" the belt towards the desired drive pulley step while the motor is running. The slight nudge with a pencil, or other dull object, will cause the rubber belt to hop from one pulley groove to the other. In most installations, once the desired tape speed is selected, it is seldom changed.

CLEANING

Such operational difficulties as flutter, slow, noisy, or erratic tape transport and tape spillage can often be traced to dirty, contaminated or oily surfaces on one or more elements of the tape transport mechanism. Vulnerable surfaces include spindle drums, belt grooves, belts, brake surfaces, pressure roller, capstan, motor pulley, drag pads, heads and bearing surfaces. For this reason, it is recommended that these surfaces be inspected and cleaned as necessary prior to looking further for the source of any mechanical difficulty. A general clean-up of these parts is also recommended as a routine preventative maintenance procedure; it is suggested that a six-month interval would be appropriate.

Driving surfaces, belt grooves, rubber belts, tape guides and head surfaces may be cleaned by wiping them with a small, soft cloth which has been lightly wetted with alcohol or carbon tetrachloride. Avoid excessive solvent, and do not allow any of it to get into bearings, as this would dilute and carry away the bearing lubricant.

MAINTENANCE

LUBRICATION

The Drive Motor should be oiled each six months, using any high grade #20 motor oil. One drop of oil should be placed in each of the two oiling slots, one at each end of the motor. Position the deck so that the oil flows down to the shaft bearing from the oiling slot. Allow it to remain in this position for about five minutes after the oil has been placed in the oil slots to assure that the oil reaches the reservoirs at the Motor Bearings. CAUTION: Do not over-lubricate; excess oiling of the motor could result in oil throwing which would almost certainly deteriorate rubber drive parts and prevent proper tape transport.

The Take-Up and Supply Reel Bearings are of the self-oiling type and will operate for a long period of time without additional lubrication. If, however, you desire to lubricate these bearings, this may be done by applying one drop of oil to the back of each Reel Shaft where it protrudes through the bearing. Place the deck on its face for about five minutes so the oil will run into the bearings.

The Capstan Bearing is also of the self-oiling type; it too, can be lubricated, if desired. Apply one drop of oil to the back of the Capstan Shaft at the bearing and place the deck on its face for about five minutes to allow the oil to run into this bearing. The front Capstan Bearing is in an inaccessible location; however, this bearing has been specially lubricated at the factory and should not need additional lubrication for the life of the machine.

The Pressure Roller Bearing may also be oiled if desired by pulling off the retaining cap, removing the cork and steel washers and the roller. Place one drop of oil on the inside of the Pressure Roller Bearing and allow it to be absorbed into the bronze bearing. Replace the roller and washers as they were and push on the retaining cap. Remove any oil which may have gotten on the rubber surface of the roller with a cloth lightly saturated with alcohol.

IN CASE OF DIFFICULTY

In the event that the Heathkit TR-1A Tape Deck fails to operate satisfactorily upon completion, it should first be determined which of the major units of the recorder is at fault. The major units are considered to be (1) the Tape Deck Mechanism including tape heads, and (2) the Electronic Preamplifier Assembly.

Tape Deck Mechanism: In the case of mechanical difficulty, the cause can usually be determined by a process of elimination and in most cases can be easily corrected. To locate the cause of trouble, first determine what functions are inoperative or operating improperly. Match the trouble to the list of difficulties in the left hand column below. Then inspect the deck for the listed possible causes of malfunction in the right hand column. It might also be advisable to review the Tape Deck Operation, Adjustment and Maintenance Sections of the manual at this time.

DIFFICULTIES	POSSIBLE CAUSE
Capstan not revolving:.....	Capstan bearing out of alignment. Rubber Drive Belt broken. Motor Pulley loose on shaft. No power to motor.
No tape movement:.....	Tape not between Capstan and Pressure Roller. Insufficient pressure between Capstan and roller. Excessive drag on Supply Reel Brake. Supply Reel Hub Bearing too tight. Control Link Adjustment so tight that Motor Drive Ring drags on Supply Hub.

No take-up or fast forward:	Insufficient tension on Take-Up Belt. Take-Up Brake not released. Take-Up Reel Hub Bearing too tight. Idler Wheel tight on shaft. Take-Up Belt not in Capstan groove. Take-Up Belt not in Take-Up Hub groove.
No rewind:	Check adjustment of Control Link which controls contact with Motor Drive. Supply Reel Hub Bearing too tight.
No output from heads:	Shorted Connector, check for solder dribbled across Connector between contacts or chassis. Broken connection at socket. Insulation on head leads overheated in soldering so that wires have shorted together.

MAKE SURE UNIT IS PLUGGED IN TO 117 V AC.

Electronic Preamplifier Assembly: In case of difficulty with the Electronic section of the TR-1A, refer to the IN CASE OF DIFFICULTY section of the TE-1 manual.

REPLACEMENTS

Material supplied with HEATHKIT products has been carefully selected to meet design requirements and ordinarily will fulfill its function without difficulty. Occasionally improper instrument operation can be traced to a faulty component. Should inspection reveal the necessity for replacement, write to the Heath Company and supply all of the following information.

A. Thoroughly identify the part in question by using the part number and description found in the manual Parts List.

B. Identify the type and model number of kit in which it is used.

C. Mention date of purchase.

D. Describe the nature of defect or reason for requesting replacement.

The Heath Company will promptly supply the necessary replacement. PLEASE DO NOT RETURN THE ORIGINAL COMPONENT UNTIL SPECIFICALLY REQUESTED TO DO SO. Do not dismantle the component in question as this will void the guarantee. This replacement policy does not cover the free replacement of parts that may have been broken or damaged through carelessness on the part of the kit builder.

SHIPPING INSTRUCTIONS

In the event that your instrument must be returned for service, these instructions should be carefully followed.

ATTACH A TAG TO THE EQUIPMENT BEARING YOUR NAME, COMPLETE ADDRESS, DATE OF PURCHASE, AND A BRIEF DESCRIPTION OF THE DIFFICULTY ENCOUNTERED. Wrap the equipment in heavy paper, exercising care to prevent damage. Place the wrapped equipment in a stout carton of such size that at least three inches of shredded paper, excelsior, or other resilient packing material can be placed between all sides of the wrapped equipment and the carton. Close and seal the carton with gummed paper tape, or alternately, tie securely with stout cord. Clearly print the address on the carton as follows:

To: HEATH COMPANY
Benton Harbor, Michigan

Include your name and return address on the outside of the carton. Preferably affix one or more "Fragile" or "Handle With Care" labels to the carton, or otherwise so mark with a crayon of bright color. Ship by parcel post or prepaid express; note that a carrier cannot be held responsible for damage in transit if, in HIS OPINION, the article is inadequately packed for shipment.

If, after applying the information contained in this manual and your best efforts, you are still unable to obtain proper performance, it is suggested that you take advantage of the technical facilities which the Heath Company makes available to its customers.

The Technical Consultation Department is maintained for your benefit. This service is available to you at no charge. Its primary purpose is to provide assistance for those who encounter difficulty in the construction, operation or maintenance of HEATHKIT equipment. It is not intended, and is not equipped to function as a general source of technical information involving kit modifications nor anything other than the normal and specified performance of HEATHKIT equipment.

Although the Technical Consultants are familiar with all details of this kit, the effectiveness of their advice will depend entirely upon the amount and the accuracy of the information furnished by you. In a sense, YOU MUST QUALIFY for GOOD technical advice by helping the consultants to help you. Please use this outline:

1. Before writing, fully investigate each of the hints and suggestions listed in this manual under "IN CASE OF DIFFICULTY." Possibly it will not be necessary to write.

2. When writing, clearly describe the nature of the trouble and mention all associated equipment. Specifically report operating procedures, switch positions, connections to other units and anything else that might help to isolate the cause of trouble.

3. Report fully on the results obtained when testing the unit initially and when following the suggestions under "IN CASE OF DIFFICULTY." Be as specific as possible and include voltage readings if test equipment is available.

4. Identify the kit model number and date of purchase, if available.

5. Print or type your name and address, preferably in two places on the letter.

Having this information, the consultant will know exactly what kit you have, what you would like it to do for you and the difficulty you wish to correct. The date of purchase tells him whether or not engineering changes have been made since it was shipped to you. He will know what you have done in an effort to locate the cause of trouble and, thereby, avoid repetitious suggestions. He will make no incorrect assumptions nor waste time checking files for the correct spelling of name and address. (The automatic letter opener sometimes cuts through the letter, hence the suggestion to print the name and address twice.) In short, he will devote full time to the problem at hand, and through his familiarity with the kit, plus your accurate report, he will be able to give you a complete and helpful answer. If replacement parts are required, they will be shipped to you, subject to the terms of the Warranty.

The Factory Service facilities are also available to you, in case you are not familiar enough with electronics to provide our consultants with sufficient information on which to base a diagnosis of your difficulty, or in the event that you prefer to have the difficulty corrected in this manner. Your Recorder may be returned for inspection and repair for a fixed service fee of $12.00 ($6.00 each for Tape Deck Mechanism and Electronics Preamplifier Assembly), plus the price of any additional parts required to make the repair. If improper operation can be traced to the Mechanical Tape Deck Mechanism only or the Electronic Preamplifier Assembly only, the unit in question may be returned alone for a fee of $6.00, plus the price of additional parts. However, if there is some question as to where the trouble lies, it would be recommended that both sections be returned for service together. Do not return the heads or head assembly to the Heath Company without the Tape Deck Mechanism. If there is some question of proper head operation, return the entire Tape Deck Section. If the Recorder is returned within the Warranty period, parts charges will be governed by the terms of the Warranty. State the date of purchase, if possible.

Local Service by Authorized HEATHKIT Service Centers is also available in some areas and often will be your fastest, most efficient method of obtaining service for your HEATHKIT equipment. Although you may find charges for local service somewhat higher than those listed in HEATHKIT manuals (for factory service), the amount of increase is usually offset by the transportation charge you would pay if you elected to return your kit to the Heath Company.

HEATHKIT Service Centers will honor the regular 90 day HEATHKIT Parts Warranty on all kits, whether purchased through a dealer or directly from Heath Company; however, it will be necessary that you verify the purchase date of your kit.

Under the conditions specified in the Warranty, replacement parts are supplied without charge; however, if the Service Center assists you in locating a defective part (or parts) in your kit, or installs a replacement part for you, you may be charged for this service.

HEATHKIT equipment purchased locally and returned to Heath Company for service must be accompanied by your copy of the dated sales receipt from your authorized HEATHKIT dealer in order to be eligible for parts replacement under the terms of the Warranty.

THIS SERVICE POLICY APPLIES ONLY TO COMPLETED EQUIPMENT CONSTRUCTED IN ACCORDANCE WITH THE INSTRUCTIONS AS STATED IN THE MANUAL. Equipment that has been modified in design will not be accepted for repair. If there is evidence of acid core solder or paste fluxes, the equipment will be returned NOT repaired.

For information regarding modification of HEATHKIT equipment for special applications, it is suggested that you refer to any one or more of the many publications that are available on all phases of electronics. They can be obtained at or through your local library, as well as at most electronic equipment stores. Although the Heath Company sincerely welcomes all comments and suggestions, it would be impossible to design, test, evaluate and assume responsibility for proposed circuit changes for special purposes. Therefore, such modifications must be made at the discretion of the kit builder, using information available from sources other than the Heath Company.

WARRANTY

Heath Company warrants that for a period of three months from the date of shipment, all Heathkit parts shall be free of defects in materials and workmanship under normal use and service and that in fulfillment of any breach of such warranty, Heath Company shall replace such defective parts upon the return of the same to its factory. The foregoing warranty shall apply only to the original buyer, and is and shall be in lieu of all other warranties, whether express or implied and of all other obligations or liabilities on the part of Heath Company and in no event shall Heath Company be liable for any anticipated profits, consequential damages, loss of time or other losses incurred by the buyer in connection with the purchase, assembly or operation of Heathkits or components thereof. No replacement shall be made of parts damaged by the buyer in the course of handling or assembling Heathkit equipment.

NOTE: The foregoing warranty is completely void and we will not replace, repair or service instruments or parts thereof in which acid core solder or paste fluxes have been used.

HEATH COMPANY

SPECIFICATION CHANGES

All prices are subject to change without notice. The Heath Company reserves the right to discontinue instruments and to change specifications at any time without incurring any obligation to incorporate new features in instruments previously sold.

PARTS LIST

PART No.	PARTS Per Kit	DESCRIPTION
Hardware		
240-2	1	5-40 stop nut
240-5	1	6-32 hex nut
240-6	2	8-32 hex nut
240-7	3	12-24 hex nut
240-8	6	3/16" SAE washer
240-9	4	3/16" x 3/8" nylon washer
240-10	1	#8 external-tooth lockwasher
240-11	16	#6 internal-tooth lockwasher
240-12	2	#8 internal-tooth lockwasher
240-13	4	1/4-20 round head machine screw, 1/4" long
240-22	3	Motor support washer
240-36	2	Spacer washer
240-37	1	Felt washer
240-38	1	Buna cork washer
240-57	3	Motor mounting washer, 9/64" ID x 3/4" OD
240-58	2	#2-3/16" E-washer
240-62	3	6-32 hex head spacer nut
240-66	17	6-32 x 1/4" pan head machine screw
240-68	6	6-32 x 3/8" pan head machine screw
250-49	4	3-48 x 1/4" binder head machine screw
250-116	5	6-32 x 1/4" stove head machine screw (black finish)
250-125	4	#6 x 3/4" truss head sheet metal screw
252-1	4	3-48 x 3/16" nut
252-16	2	Speednut
253-27	1	5/32" ID x 5/16" OD steel washer
254-7	4	#3 lockwasher
255-2	4	Spacer
255-23	4	5/16" x 6-32 threaded spacer
259-6	1	Solder lug
Miscellaneous		
73-6	4	Rubber grommet
240-14	1	Control spring
240-16	1	Pressure roller
240-17	1	Idler pivot assembly
240-18	1	Idler
240-19	1	Control link
240-20	1	Supply reel brake assembly

PART No.	PARTS Per Kit	DESCRIPTION
Miscellaneous, Cont'd.		
240-21	1	Motor bracket
240-23	1	Outer bearing plate with bearing installed
240-26	1	Supply reel bearing housing with bearing installed
240-27	1	Take-up reel bearing housing with bearing installed
240-28	1	Capstan assembly
240-29	1	Pulley
240-30	1	Take-up belt
240-31	2	Tape guide
240-32	1	Compensator post
240-33	1	Head cover
240-34	2	Cover grip
240-35	1	Retaining cap
240-39	1	Drive ring
240-40	1	Motor belt
240-41	3	Tension spring
240-42	1	Motor
240-43	1	Fan
240-44	1	Tape feed compensator
240-45	1	Compensator cover
240-46	1	Interlock
240-47	2	Keeper
240-48	1	Tape guide sleeve
240-49	3	Lord shock mount
240-51F244	1	Front panel
240-52	1	Tape lifter and pressure pad assembly
240-60	1	Supply reel hub
240-61	1	Take-up reel hub
240-63	1	Pressure arm
240-65	1	Take-up reel brake assembly
240-67	1	Chassis assembly
258-29	1	Pressure pad control link
204-M203	1	Mounting bracket (left-hand)
204-M204	1	Mounting bracket (right-hand)
390-74	1	Adhesive label
A391-5	1	Heathkit monogram
434-82	1	Double phono jack
438-3	2	Phone plug
438-17	1	AC power plug
444-3	1	Plastic tape reel (empty)
448-4	1	Reel recording tape
462-69	1	Shift knob
490-15	1	Torque gauge
490-18	1	Allen wrench
595-285	1	Construction manual

HELPFUL KIT BUILDING INFORMATION

Before attempting actual kit construction read the construction manual through thoroughly to familiarize yourself with the general procedure. Note the relative location of pictorials and pictorial inserts in respect to the progress of the assembly procedure outlined.

This information is offered primarily for the convenience of novice kit builders and will be of definite assistance to those lacking thorough knowledge of good construction practices. Even the advanced electronics enthusiast may benefit by a brief review of this material before proceeding with kit construction. In the majority of cases, failure to observe basic instruction fundamentals is responsible for inability to obtain desired level of performance.

RECOMMENDED TOOLS

The successful construction of Heathkits does not require the use of specialized equipment and only basic tools are required. A good quality electric soldering iron is essential. The preferred size would be a 100 watt iron with a small tip. The use of long nose pliers and diagonal or side cutting pliers is recommended. A small screw driver will prove adequate and several additional assorted screw drivers will be helpful. Be sure to obtain a good supply of rosin core type radio solder. Never use separate fluxes, paste or acid solder in electronic work.

ASSEMBLY

In the actual mechanical assembly of components to the chassis and panel, it is important that the procedure shown in the manual be carefully followed. Make sure that tube sockets are properly mounted in respect to keyway or pin numbering location. The same applies to transformer mountings so that the correct transformer color coded wires will be available at the proper chassis opening.

Make it a standard practice to use lock washers under all 6-32 and 8-32 nuts. The only exception being in the use of solder lugs—the necessary locking feature is already incorporated in the design of the solder lugs. A control lock washer should always be used between the control and the chassis to prevent undesirable rotation in the panel. To improve instrument appearance and to prevent possible panel marring use a control flat nickel washer under each control nut.

When installing binding posts that require the use of fiber insulating washers, it is good practice to slip the shoulder washer over the binding post mounting stud before installing the mounting stud in the panel hole provided. Next, install a flat fiber washer and a solder lug under the mounting nut. Be sure that the shoulder washer is properly centered in the panel to prevent possible shorting of the binding post.

WIRING

When following wiring procedure make the leads as short and direct as possible. In filament wiring requiring the use of a twisted pair of wires allow sufficient slack in the wiring that will permit the twisted pair to be pushed against the chassis as closely as possible thereby affording relative isolation from adjacent parts and wiring.

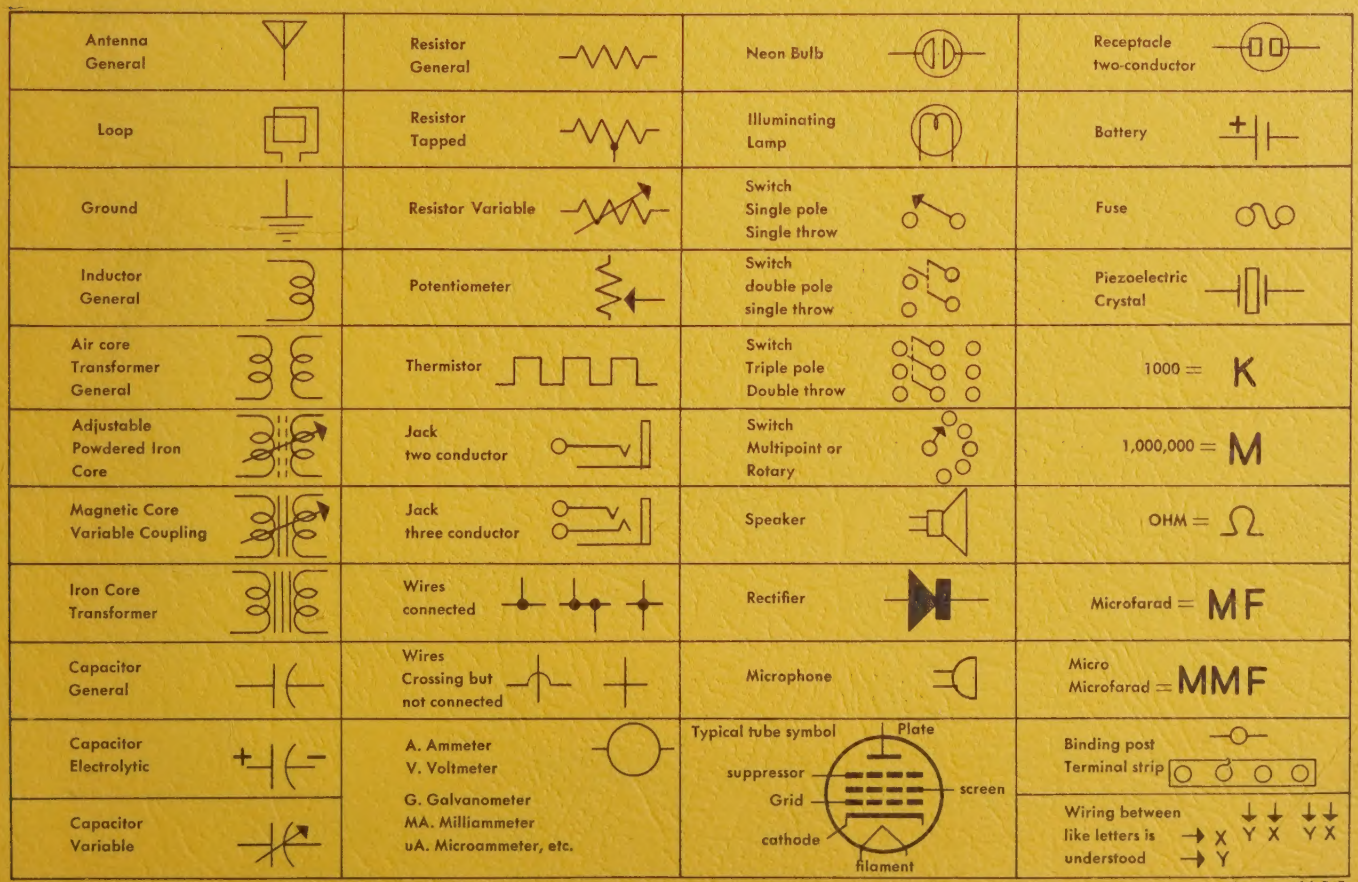
When removing insulation from the end of hookup wire, it is seldom necessary to expose more than a quarter inch of the wire. Excessive insulation removal may cause a short circuit condition in respect to nearby wiring or terminals. In some instances, transformer leads of solid copper will have a brown baked enamel coating. After the transformer leads have been trimmed to a suitable length, it is necessary to scrape the enamel coating in order to expose the bright copper wire before making a terminal or soldered connection.

In mounting parts such as resistors or condensers, trim off all excess lead lengths so that the parts may be installed in a direct point-to-point manner. When necessary use spaghetti or insulated sleeving over exposed wires that might short to nearby wiring.

It is urgently recommended that the wiring dress and parts layout as shown in the construction manual be faithfully followed. In every instance, the desirability of this arrangement was carefully determined through the construction of a series of laboratory models.

SOLDERING

Much of the performance of the kit instrument, particularly in respect to accuracy and stability, depends upon the degree of workmanship used in making soldered connections. Proper soldered connections are not at all difficult to make but it would be advisable to observe a few precautions. First of all before a connection is to be soldered, the connection itself should be clean and mechanically strong. Do not depend on solder alone to hold a connection together. The tip of the soldering iron should be bright, clean and free of excess solder. Use enough heat to thoroughly flow the solder smoothly into the joint. Avoid excessive use of solder and do not allow a flux flooding condition to occur which could conceivably cause a leakage path between adjacent terminals on switch assemblies and tube sockets. This is particularly important in instruments such as the VTVM, oscilloscope and generator kits. Excessive heat will also burn or damage the insulating material used in the manufacture of switch assemblies. Be sure to use only good quality rosin core radio type solder.



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